

its thickness; and that, between the finishing of one coat and the beginning of the next, there was some interval of time, and some suspension of that attractive power whereby, or of that component matter whereof, the several coats are respectively formed.

Strand, May 8, 1760.

H. Baker.

LXVIII. *An Explanation of the Modes or Tones in the antient Græcian Music; by Sir Francis Haskins Eyles Stiles, Bart. F. R. S.*

Read Decem-
ber 1759, and
January, &c.
1760.

Notwithstanding the valuable editions of the antient musical and harmonic writers, given by Meibomius and Wallis, and the great pains those two learned editors have bestowed on the correcting the tables, and throwing light on the difficult passages of those works, there are some of the doctrines delivered in them, that seem still to require a more perfect explanation. Those, that respect the tones or modes, in particular, seem to have been ill understood: and as it was on these, that the effects of the antient music were supposed principally to depend, I have thought, that the subject might well merit a re-examination.

Concerning these modes, we find two distinct, and seemingly contradictory doctrines delivered by the antients; and this it is, which has perplexed the subject;

ject; for some, not aware of the distinction, have charged the antients with contradictions; and others, who perceived the two doctrines, not being able to reconcile them, have either adopted one, and rejected the other, or given up the subject as hopeless: but, as they were both admitted by the antients, they must both have been true, in some sense. What, therefore, I have principally in view in these sheets, is to shew, that the difference between the doctrines arose only from the different way of considering one and the same object; and that therefore there was such an agreement betwixt them, as that, under certain restrictions, they may be embraced under one common interpretation.

For distinction sake, I shall call one of these doctrines the harmonic, and the other the musical doctrine; the reason of which will sufficiently appear, when I come to treat of the distinction between the science of harmonic and that of melopœia or musical composition.

According to the harmonic doctrine, the number of the modes had been augmented to fifteen; but as Ptolemy, who appears to have favoured the musical, reduces them to seven, and as it is on the principles of that writer, that I propose to shew an agreement between the doctrines, it will be necessary for me, in treating of the harmonic modes, to distinguish the seven he admits from the eight he has excluded.

This being premised, I shall be understood in making the distribution of what I have to offer upon this subject, which I propose to treat under the following six heads.

First,

First, To explain the harmonic doctrine, as far as concerns the seven modes admitted by Ptolemy.

Secondly, To explain the musical doctrine of the same modes, and shew its agreement with the harmonic.

Thirdly, To explain the eight harmonic modes rejected by Ptolemy, and give at large his reasons for excluding them.

Fourthly, To point out something of the origin of the two doctrines.

Fifthly, To shew how far the preceding explanations may be supported by arguments, or warranted by the testimony of antient writers.

Lastly, To consider how this subject has been understood by Meibomius, Wallis, and some few others that have wrote since, and in what respect their explanations differ from my own.

I now proceed to the first head ; *viz.*

First, To explain the harmonic doctrine, as far as concerns the seven modes admitted by Ptolemy.

The harmonic doctrine of the tones we find expressly delivered in the harmonic treatises ; which, probably, is the reason, why, among the moderns, the later writers at least have, for the most part, determined themselves in its favour : how justly it is intitled to the preference, I shall have sufficient occasion to examine. The treatises on harmonic, that are come down to us, are mostly Aristoxenian, which school seems to have treated the science, if not better, at least

least more methodically than any other, of which we can now form a judgment; and hence we find their divisions often adopted by antient writers, who might not, perhaps, be ready to admit all their principles. In considering the physical properties of sound, and the ratios of intervals, the Aristoxenians appear to have been less exact than the Pythagoreans, the doctrines of the former being more adapted to the gross and familiar notions of the practical musician, than to the accurate speculations of the philosopher. But, however exceptionable their treatises may have been in this respect, they are the more valuable to us, on this very account, as they give more light into the antient practice of music; which is what is chiefly desired, the philosophic principles of the science being better understood. By this school harmonic was divided into these seven parts; 1. of sounds, 2. of intervals, 3. of genera, 4. of systems, 5. of tones, 6. of mutations, 7. of melopœia. The propriety of their adding this last division I shall have occasion to consider. Of these divisions, it was the fifth, which contained the doctrine in question; but, to complete it, the sixth must also be taken in; for, amongst other mutations, that of the tones was there treated of, and was indeed the most considerable object of that division. This doctrine taught, that the difference between one tone and another lay in the tension or pitch of the system. The system (by which I mean the greater perfect one, exclusive of the less, of which I shall have little occasion to speak) consisted of fifteen sounds, extending to a disdiapason, or double octave. How these sounds were denominated, and at what intervals they succeeded each other, in
the

the diatonic genus, to which I shall confine this explanation, is so well known, that I need say no more concerning the structure of the system, than that it answered to that of our natural scale, beginning with Are, and ending with Alamire. This system was held immutable, as to the relation of its parts one to another; that is, the order of sounds and intervals, by which it proceeded, was in the same genus to be always the same; but the tension or pitch of the whole was variable, a different one being assigned for each mode. The explanation, therefore, usually given of the system, by comparing it, as I have done, to a double octave, from A in our natural scale, is not to be understood as fixing its pitch, but as shewing its succession only; which might as well be done by a double octave from B, taking C \sharp and F \sharp into the scale, or from any other note, taking in the flats and sharps necessary to make the tones and semitones follow in the same order.

The relation of the parts to each other in the system being immutable, the fixing the pitch of any one sound in it, for any mode, was sufficient to determine that of all the rest. For this purpose, the sound mese was commonly used; which, by its situation, was well adapted to it, being the middle sound of the system. If, therefore, we settle the position of the mese for each mode, we shall do all, that is requisite for the clearing up and establishing the harmonic doctrine, which considered the modes as differing only in the pitch of the system.

The modes admitted by the Aristoxenians were thirteen in number; to which two more were added by later harmonicians; and to the mese of each of

these fifteen a distinct pitch was assigned; but, as Ptolemy has rejected eight of them, I shall, as I have proposed first, separately consider the positions of the mesē for the seven modes he admits.

Concerning the relative pitch of the respective mesēs for these seven modes, I find no disagreement amongst the harmonic writers. There are not wanting, indeed, who charge the antients with giving, in respect thereto, contradictory accounts. Amongst others, the learned Dr. Gregory asserts, that Aristides Quintilianus inverts the order of the modes (1): but what led the doctor into this mistake, was his not distinguishing the double doctrine. Aristides, in the passage cited, is not speaking of the pitch of the system for the seven modes in question, but of the seven species of diapason, as they lay in the system; which was, indeed, in the inverted order of the mesēs of the seven modes, as will appear, when we come to consider the other doctrine. This, then, is no contradiction in the Greek writer, nor, if it were, would it be chargeable singly on him; since, if the doctor had but cast his eye on his own Euclid (2), he would have met with the very same doctrine he found in Aristides. But his remark is, indeed, entirely without foundation; and I make no scruple to assert, that the antients agree in their accounts of the relative pitch of the mesēs, for these seven modes;

(1) Atque Aristides Quintilianus (pag. 18. editionis Meibomianæ) tonum Hypodorum acutiorem facit quam Dorium, et Hypophrygium quam Phrygium, et Hypolydium quam Lydium. Vide Præfat. ad Opera Euclid.

(2) Pag. 540. vers. 6. et seq. seu pag. 15. vers. 15. edit. Meibom.

for though many of the harmonic writers treat of the thirteen or fifteen modes all together, without distinguishing the seven in question, yet they have given them in such order, and at such distances, that the seven stand at the same intervals from each other, as are assigned for them by those, who have treated of them separately; so that all the accounts agree in this particular. The direction we may conveniently take from Bacchius (3), where it is clearly and concisely delivered; and where it appears, that the Mixolydian was the most acute; the Lydian, graver by a semitone; the Phrygian, graver than the Lydian by a tone; the Dorian, graver than the Phrygian by a tone; the Hypolydian, graver than the Dorian by a semitone; the Hypophrygian, graver than the Hypolydian by a tone; and the Hypodorian, graver than the Hypophrygian by a tone. Now, as the Guidonian scale, in use amongst the moderns, when stripped of Guido's additions, answers to the system of the antients, in its natural situation, which was in the Dorian mode, and our Alamire consequently answers to the pitch of the Dorian mese, we have a plain direction for finding the absolute pitch of the meses, for all the seven in our modern notes, and they will be found to stand thus:

Mixolydian mese in	<i>d</i>	Hypolydian in	- - <i>g</i> \sharp
Lydian in	- - - <i>c</i> \sharp	Hypophrygian in	- <i>f</i> \sharp
Phrygian in	- - <i>b</i>	Hypodorian in	- - <i>e</i>
Dorian in	- - - <i>a</i>		

But to understand this doctrine, as it is delivered by the antients, it will be necessary also to examine, how

(3) Pag. 12. edit. Meibom.

the meses of the seven modes were stationed upon the lyre ; and, in order to this, we must consider the structure of that instrument. The lyre, after its last enlargement, consisted of fifteen strings, which took in the compass of a disdiapason, or double octave. These strings were called by the same names as the fifteen sounds of the system, and when tuned for the Dorian mode, corresponded exactly with them. Indeed there can be no doubt, but that the theory of the system had been originally drawn from the practice of the lyre in this mode, which was the favourite one of the Greeks, as the lyre was also their favourite instrument. In this mode, then, the mese of the system was placed in the mese of the lyre ; but in every one of the rest, it was applied to a different string, and every sound of the system transposed accordingly. Hence arose the distinction between a sound in power and a sound in position ; for when the system was transposed from the Dorian to any other mode, (suppose, for instance, to the Phrygian) the mese of the lyre, though still mese in position, acquired, in this case, the power of the lichanos meson ; and the paramese of the lyre, though still paramese in position, acquired the power of the mese. In these transpositions, one or more of the strings always required new tunings, to preserve the relations of the system ; but, notwithstanding this alteration of their pitch, they retained their old names, when spoken of, in respect to their positions only ; for the name implied not any particular pitch of the string, but only its place upon the lyre, in the numerical order, reckoning the proslambanomenos for the first.

I thought

I thought this remark the more necessary, as I suspect it was the not attending to this circumstance, that led Dr. Wallis to assign *c* and *g* natural, for the places of the *mesē* in the Lydian and Hypolydian modes, instead of *c*# and *g*#, where I have placed them (4). But, to return,

We are now to give the places of the *mesē* for these seven modes upon the lyre, which are thus settled by Ptolemey (5).

		String
Mixolydian		11
Lydian		10
Phrygian		9
Dorian		8
Hypolydian		7
Hypophrygian		6
Hypodorian		5

The positions assigned for the *mesēs* of these seven modes, by the harmonic doctrine, being thus settled, both in our modern scale, and upon the lyre, I come now,

Secondly, To explain the musical doctrine of the same modes, and shew its agreement with the harmonic.

The musical doctrine taught, that the difference between one mode and another consisted in the manner of dividing an octave, or, as the antients express it, in the different species of diapason. The elementary principles of these species we find delivered

(4) See his edition of Ptolemey, p. 137.

(5) *Ibidem.*

in the harmonic writers; but as in the Aristoxenian treatises, they are not found under the fifth division, of tones; nor under the sixth, of mutations, where it was natural to expect them; but under the fourth, of systems; and it not being there expressly affirmed, that the species had a relation to the tones, though, from their denominations, and other circumstances, it might well be inferred, this has created a difficulty in admitting their connection with the subject. The obviating of this objection I shall reserve for my fifth head; where I shall take occasion, particularly, to justify this doctrine, and the use I shall have made of it; and I shall therefore proceed to explain it, as I find it in the harmonic writers.

To understand how this doctrine of the species of diapason came to be treated under the head of systems, it will be necessary to consider the definition given of the term system by the Aristoxenians, and their subdivision of this branch of harmonic.

With this school, whatever consisted of more than one interval, was a system. So comprehensive a definition could not but make this branch a very large one; and so we accordingly find it. It was subdivided in the manner following: systems were there considered as differing in respect, first, to magnitude; secondly, to genus; thirdly, to the being consonant or dissonant; fourthly, to the being rational or irrational; fifthly, to the being sequent or transgressive; sixthly, to the being conjunct or disjunct; seventhly, to the being mutable or immutable. Now, of these seven differences, it was under the third that the doctrine of the species of diapason came to be treated, the consonant systems being there enumerated, and explained.

explained. By a consonant system was understood a system, whose extreme or comprehending sounds were consonant: of these, there were six within the compass of the immutable system, *viz.* the diatessaron, diapente, diapason, diapason and diatessaron, diapason and diapente, and disdiapason. These consonant systems were considered as admitting each of a variety in the order of the intervals, of which it was composed. A system of a determined magnitude, composed of the same intervals, and of the same number of them, might, if the component intervals were not equal, differ in respect to their order or succession. These variations of each system they called *ειδος*, its species, or *σχημα*, its figure, for these terms were synonymous (6). The species of diatessaron were three; those of the diapente four, and those of the diapason seven, being the sum of the species of the other two consonances, of which the diapason itself was composed: and here the doctrine of the species stopped; for, in the three larger consonant systems, they seem not to have considered the species of the whole magnitude, but only those of the three smaller systems, of which they were composed, and which are called, by Ptolemy, the first consonances (7). As the species of diatessaron and diapente do not immediately concern this doctrine, the explaining them will be unnecessary; and I shall therefore proceed to those of the diapason.

(6) Μετὰ δὲ τῶντα λεκτέρ, Τίς ἐστι, καὶ πόια τις, οὐ κατ' εἶδος διαφορές; διαφέρει δὲ οὐδὲν, εἶδος λέγειν οὐ χῆμα· φέρειν γάρ εἰμούτερος τὰ οὐδέματα τῶντα εἰπει τὸ άυτό. Aristo. p. 74. v. 9.

(7) Πρεδιούσιον τὰς κατὰ τὸ καλέμενον εἶδος τῶν πρώτων συμφωνιῶν διαφορές. Ptol. lib. ii. c. 3.

Concerning

Concerning these, I find no disagreement amongst the writers of antiquity: they all agree, that they were seven in number, and had the denominations of Mixolydian, Lydian, Phrygian, Dorian, Hypolydian, Hypophrygian, and Hypodorian; circumstances, which leave no doubt of their connection with the modes. The succession of intervals, or manner of dividing the diapason for each species, has been variously explained by the antient writers; but the result of these explanations is the same, excepting the generic differences. It will be sufficient here to give what respects the diatonic genus only, as the question concerning the tones does not turn upon the distinction of the genera.

In the diatonic genus, the diapason consisting of five tonic and two semitonic intervals, the Aristoxenians fixed the succession for each species, by the position of the two semitones; shewing, at the same time, between which of the sounds of the immutable system the species in question was comprehended: for this system consisting of fifteen sounds, contained eight octaves, two of which, *viz.* that from proslambanomenos to mese, and that from mese again to netehyperboleon, were divided after the same manner, and therefore constituted the same species: but the six others were all differently divided; so that the system contained within itself the seven species of diapason, and thence obtained the denomination of perfect; the lesser perfect system, which reached only to a diapason and diatessaron, being improperly so called for want of this qualification, as Ptolemy has

has shewn (8). According to this method of explaining the species of diapason, they stand as follows :

Species.	From hypate hypaton to paramese.
1. Mixolydian	{ Semitones, first interval in the grave, fourth in the acute.
2. Lydian	{ From parhypate hypaton to trite diezeugmenon. Semitones, third interval in the grave, first in the acute.
3. Phrygian	{ From lichanos meson to paranete diezeugmenon. Semitones, second interval in the grave, second in the acute.
4. Dorian	{ From hypate meson to nete diezeugmenon. Semitones, first interval in the grave, third in the acute.
5. Hypolydian	{ From parhypate meson to trite hyperbolæon. Semitones, fourth interval in the grave, first in the acute.
6. Hypophrygian	{ From lichanos meson to paranete hyperbolæon. Semitones, third interval in the grave, second in the acute.

(8) "Οδει τὸ συντιθέμενον ἐκ τῆς διατασσῶν καὶ διὰ τεωρῶν σύγκριτα τέλειον εἰ καλῶς ἔχει καλτὸν ταῦτα μὲν γαρ ἐπὶ τὰ εἰδή τῆς διατασσῶν καὶ διὰ ποτὲ πειράζει. Ptol. Harm. p. 106. v. 3.

Species.

7. Hypodorian

From mese to nete hyperbolæon,
or prosl. to mese.
Semitones, second interval in the
grave, third in the acute.

It must be here observed, that these species, as they stand in the system, are, with respect to acute-ness and gravity, in the inverted order of the seven modes, as settled by the harmonic doctrine, which will account for the mistake, which Dr. Gregory (as was shewn above) and others have fallen into, in imagining the antients did not agree in their accounts of the modes; since it is plain these writers did not observe, that, in the one case, the modes were spoken of with respect to the position of the system itself, and in the other, with respect to the position of the seven species within the system.

These species may also be more readily shewn, by examples out of the Guidonian scale, where, keeping the natural notes, they will stand thus:

Mixolydian	from	B to <i>b.</i>
Lydian		C to <i>c.</i>
Phrygian		D to <i>d.</i>
Dorian		E to <i>e.</i>
Hypolydian		F to <i>f.</i>
Hypophrygian		G to <i>g.</i>
Hypodorian		<i>e</i> to <i>aa</i> , or A to <i>a.</i>

But as well this, as the former way of shewing them, we are to understand only as exemplifications of the succession of the intervals, and not as an assignment of the pitch for each, which was to depend on that of the system, out of which they are exemplified; and

and it may not be amiss therefore, in order to prevent any limited conception of these species, to state generally the order of the intervals, of which each is composed; which will be as follows, proceeding in each from grave to acute.

Mixolydian.	Semitone, tone, tone, semitone, tone, tone, tone.
Lydian.	Tone, tone, semitone, tone, tone, tone, semitone.
Phrygian.	Tone, semitone, tone, tone, tone, semitone, tone.
Dorian.	Semitone, tone, tone, tone, semitone, tone, tone.
Hypolydian.	Tone, tone, tone, semitone, tone, tone, semitone.
Hypophrygian.	Tone, tone, semitone, tone, tone, semitone, tone.
Hypodorian.	Tone, semitone, tone, tone, semitone, tone, tone.

Besides the manner above-mentioned of explaining the species of diapason, the antients have given us another, the result of which is the same; and that is, by the position of the diazeuctic tone, or interval from *mese* to *paramese*. In the Mixolydian species, the diazeuctic tone was the first interval, reckoning from acute to grave; in the Lydian, it was the second; in the Phrygian, the third; in the Dorian, the fourth; in the Hypolydian, the fifth; in the Hypophrygian, the sixth; and in the Hypodorian, the last.

Now, either of these methods fixes the succession of intervals peculiar to each species; but as the examples are taken from a system, whose pitch was variable, we are still to seek, at what absolute pitch the several species were taken in the modes, to which we suppose them to have been respectively subservient; and it is, perhaps, the seeming difficulty of settling this, that has induced so many to reject this doctrine entirely, and fall in with the harmonic writers, who considered the modes as differing only

in the pitch of the system: but, by taking in the assistance of the harmonic doctrine, we shall not only gain the true pitch for each species in the musical, but be led to see the agreement between the two doctrines, which, I have already said, was my principal view in these sheets, and which, having gone through the explanation of each doctrine separately, as far as concerns the seven modes, we are now ripe for considering; for the eight modes, whose explanation I have deferred, have no concern in this agreement, being rejected by Ptolemy, as will appear, for this very reason, in substance, that they would stand the trial of the harmonic doctrine only, whereas the rest had the support of both. Let us then consider how the two doctrines, as I have explained them, may be made to agree.

By the harmonic doctrine, we are told the pitch of the system for each mode; and by the musical, in what part of the system to take the species of diapason: now, by combining these two directions, we gain the following plain canon, for finding any mode required.

C A N O N.

First pitch the system for the mode, as directed by the harmonic doctrine; then select from it the diapason, directed by the musical; and we have the characteristic species of the mode in its true pitch.

To make this more plainly appear, and also to avoid the length of particular explanations, I have annexed a diagram of the seven species, which will shew at what pitch of the Guidonian scale each sound

of

DIAGRAM I. Of the Species of Diapason in the Seven Modes admitted.

Mixolydian.		Lydian.		Phrygian.		Dorian.		Hypolydian.	
<i>e</i>	Paramefe.	<i>e</i>	Trite diez.	<i>e</i>	Paran. diez.	<i>e</i>	Nete diez.	<i>e</i>	Trite hyperb.
<i>d</i>	Diaz. tone.	<i>d</i> ♯	Paramefe.	<i>d</i>	Trite diez.	<i>d</i>	Paran. diez.	<i>d</i> ♯	Nete diez.
<i>c</i>	Mefe.	<i>c</i> ♯	Diaz. tone.	<i>c</i> ♯	Paramefe.	<i>c</i>	Trite diez.	<i>c</i> ♯	Paran. diez.
<i>b</i>	Lich. mef.	<i>b</i>	Mefe.	<i>b</i>	Diaz. tone.	<i>b</i>	Paramefe.	<i>b</i>	Trite diez.
<i>a</i>	Parhyp. mef.	<i>a</i>	Lich. mef.	<i>a</i>	Mefe.	<i>a</i>	Diaz. tone.	<i>a</i> ♯	Paramefe.
<i>g</i>	Hyp. mef.	<i>g</i> ♯	Parhyp. mef.	<i>g</i>	Lich. mef.	<i>g</i>	Mefe.	<i>g</i> ♯	Trite diez.
<i>f</i>	Lich. hyp.	<i>f</i> ♯	Hyp. mef.	<i>f</i> ♯	Parhyp. mef.	<i>f</i>	Diaz. tone.	<i>f</i> ♯	Mefe.
<i>e</i>	Parhyp. hyp.	<i>e</i>	Lich. hyp.	<i>e</i>	Hyp. mef.	<i>e</i>	Lich. mef.	<i>e</i>	Parhyp. mef.
	Hyp. hyp.		Parhyp. hyp.		Parhyp. mef.		Parhyp. mef.		Parhyp. mef.

mitted by PTOLEMY.

		Hypophrygian.		Hypodorian.
hyperb.	<i>e</i>	Paran. hyperb.	<i>e</i>	Nete hyperb.
diez.	<i>d</i>	Trite hyperb.	<i>d</i>	Paran. hyperb.
diez.	<i>c</i> [#]	Nete diez.	<i>c</i>	Trite hyperb.
diez.	<i>b</i>	Paran. diez.	<i>b</i>	Nete diez.
fe.	<i>a</i>	Trite diez.	<i>a</i>	Paran. diez.
fe.	<i>g</i> [#]	Paramese.	<i>g</i>	Trite diez.
mes.	<i>f</i> [#]	Diaz. tone. Mese.	<i>f</i> [#]	Paramese.
. mes.	<i>e</i>	Lich. mes.	<i>e</i>	Diaz. tone. Mese.

of the diapason is brought out by the canon for each of the seven modes. As in the construction of this diagram, the directions of the canon have been strictly pursued, so it will appear, that the result of it is, in all respects, conformable to the principles of both doctrines. Thus in the Dorian, for instance, it will be seen, that the mese is placed in Alamire, and that the rest of the sounds exhibited in that diapason, are placed at the proper distances, for preserving the order of the system, as required by the harmonic doctrine. It will be also seen, that the diapason selected lies between hypate meson and nete diezeugmenon; that the semitones are the first interval in the grave, and third in the acute; and that the diazeumatic tone is in the fourth interval, reckoning from the acute; all which circumstances were also required by the musical doctrine for this mode; and, in the rest of the modes, all the circumstances required by each doctrine will, in like manner, be found to obtain: so that no objection can well be raised to the principles, on which the diagram has been framed, by the favourers of either doctrine separately; and the very coincidence of the two doctrines therein, might furnish a probable argument in justification of the manner, in which I have combined them in the canon. But as I propose to consider this under the fifth head, where the proofs will be collected, I shall leave this argument for the present, and proceed to explain,

Thirdly, The eight harmonic modes rejected by Ptolemy, and give at large his reasons for excluding them.

Six of these modes, with the seven Ptolemy allowed, made up the thirteen allowed by the Aristoxenians: the other two seem to have been added afterwards, more with a view to regularity in the names and positions of the modes, than to any particular use, as will appear in the course of the explanation. For the settling these eight modes, I shall have no occasion to go farther than the fixing the position of the *mesē* for each, according to the harmonic doctrine: the result of applying the musical doctrine to them will sufficiently appear, when I come to explain the reasons, which Ptolemy has assigned for rejecting them.

The old Dorian, Phrygian, and Lydian modes, having, as we have seen, their *mesēs* respectively in *a*, *b*, *c*#, at the distance of a tone from each other, these tonic spaces were afterwards divided, to make room for the Ionian *mesē* in *b* flat, and the *Æolian* in *c* natural. To these five modes, whose *mesēs* succeeded each other at the interval of a semitone, and which came, in time, to be called the middle modes, five others were made to correspond, that lay respectively graver by a fourth, and took their denominations from them, but compounded with the preposition *hypo*, to distinguish them. Of these, we have already shewn the Hypodorian *mesē* to have been in *e*, the Hypophrygian in *f*#, and the Hypolydian in *g*#. Now, the two tonic spaces between *e*, *f*#, and *g*#, being likewise divisible, the Hypo-ionian *mesē* was inserted in *f* natural, and the Hypo-æolian in *g* natural, at a fourth respectively from the Ionian and *Æolian*. To these ten modes, it was conceived that five more might properly be ranged towards

towards the acute, at the distances of a fourth respectively from the five first mentioned, and taking their denominations from them also, but compounded with the preposition *hyper*, which would complete them to fifteen, divided into five grave, five middle, and five acute. But the Aristoxenians limiting the positions of the mese to the compass of an octave, had established only three out of these last five, *viz.* the old Mixolydian, whose mese we have shewn to be in *d*, at a fourth from the Dorian, and which was therefore afterwards called Hyperdorian; the Hyperionian, whose mese was in *e* flat, at a fourth from the Ionian; and the Hypermixolydian (for so it had been originally named, the preposition being taken in a different sense), the mese of which was in *e*, at a fourth from the Phrygian, and which was therefore afterwards called the Hyperphrygian. To make these acute modes therefore five in number, as well as the grave and middle ones, two new modes were added, *viz.* the Hyperæolian, whose mese was in *f*, and the Hyperlydian, whose mese was in *f*#, at a fourth respectively from the Æolian and Lydian.

The modes being thus augmented to fifteen, upon the single principle of the harmonic doctrine, their meses will be found to stand all together in the following order.

Acute	Hyperlydian	- - - - -	in <i>f</i> #
	Hyperæolian	- - - - -	<i>f</i>
	Hyperphrygian, or Hypermixolydian	-	<i>e</i>
	Hyperionian	- - - - -	<i>e</i> #
	Hyperdorian, or Mixolydian	- - -	<i>d</i>

Middle

	Lydian	-	-	-	-	-	-	in c [#]
Middle	Æolean	-	-	-	-	-	-	c
	Phrygian	-	-	-	-	-	-	b
	Ionian	-	-	-	-	-	-	bb
	Dorian	-	-	-	-	-	-	a
	Hypolydian	-	-	-	-	-	-	in g [#]
Grave	Hypoæolian	-	-	-	-	-	-	g
	Hypophrygian	-	-	-	-	-	-	f [#]
	Hypoionian	-	-	-	-	-	-	f
	Hypodorian	-	-	-	-	-	-	e

Having now shewn, how these fifteen modes were situated according to the harmonic doctrine, I come to the objections raised by Ptolemy against the eight last explained. For the right understanding of which, it will be necessary to give an account of all that he has delivered on the subject of the modes, a task of some difficulty; for though his reasoning appears to me most clear and methodical, it is rather too prolix to be given exactly in his own words, as this, with the necessary explanations of those passages, of which the sense is less obvious, would carry me to too great a length. I must therefore endeavour to abridge his doctrines, though at the hazard of leaving out some of the substantial parts, and thereby doing injustice to his argument.

It will be expedient to premise something concerning his apparent intention, and method of reasoning in this part of his work, which will serve as a key to his argument: and this seems the more necessary, as he has been thought by some (9) to

(9) So obscurely has the best of all the antient writers (Ptolemy) delivered himself on this article (the tones), that deserved to have been most clearly handled. Malcolm's Treatise on Music, p. 539. have

have written very obscurely upon the subject. His chief view was to reduce the fifteen modes, admitted upon the principle of the harmonic doctrine, to those seven, which had the support also of the musical: but this reformation was to be attempted with great precaution, on account of the obstinate prejudices it was likely to meet with, from the harmonicians of his own time: And we shall therefore find him first artfully treating the modes upon the foot of the harmonic doctrine only, and arguing *ad homines* for the reduction of the modes, even upon their own principles; but, before he drops the subject, his true reasons will appear; and, indeed, it will easily be seen, that he had them constantly in view from the first, though he does not argue openly upon them. This will account for that mixture of the two doctrines, which is found in his writings, and will, with the assistance of a few explanations, render intelligible what he has delivered upon the subject.

The tones he considers, after the harmonic doctrine, as mutations by whole constitutions, which, he tells us, are therefore properly called tones, as they are differences in respect to tension. These differences he admits to be infinite in possibility, but argues, that in efficacy, and in respect to sense, they are finite, and liable to certain limitations. These limitations he derives from the theory of the consonances, by which means, he lays a foundation for his future argument, for reducing the modes to the number of species of the consonance diapason. The limitations of the tones, which he proposes to regulate by those of the consonances, are, as he tells us, threefold; *viz.*

1. As to the distance, or ratio, as he expresses it, of the extreme tones; for the Pythagoreans, whose method he adopts with some improvements of his own, measured intervals by the ratios of the comprehending sounds.

2. As to the number of tones to be admitted between these extremes. And,

3. As to the intervals, at which they were to stand in succession, which he calls their excesses.

Thus in the diatessaron consonance, which he instances, these three circumstances are observable; first, That the ratio of the extreme sounds is sesquiterian; secondly, That the component intervals, or ratios, are three; and thirdly, That such and such are the differences of those ratios, meaning the intervals in succession. But here he observes, that, in the consonances, these limitations have each their distinct cause; whereas in the tones, the first being determined, the other two necessarily followed, as being dependent on the same conditions. This remark will hardly be intelligible, without some explanation. The interval, or ratio of the extreme sounds in each consonance, though differently treated by the Aristoxenian and Pythagorean schools, were yet determined, both by the one and the other, upon principles, which concerned not their intermediate division: their intermediate division again was settled by a doctrine, that required, in the composition of intervals, either that every fourth sound should complete the diatessaron, or every fifth the diapente; without one or other of which circumstances, the composition was held inconcinnous

nous (10); and hence the diateffaron could not be divided into more than three ratios, nor the diapente into more than four; and again, the excesses of the ratios, or intervals in succession, were assigned by the doctrine of the genera; so that in the consonances, each of the three limitations had a separate cause; but in applying the same limitations to the tones, there was a connection between them; so that the determining the first, determined the rest. Thus, for instance, if the interval diateffaron, or sequitertian ratio, should be assigned for the limitation of the extreme tones, the other limitations could only be such, as were assigned for that consonance; that is, the component ratios must be three, and the excesses of those ratios such, as were established for the diateffaron by the doctrine of the genera. But the not knowing the necessity of this consequence, he tells us, had occasioned a great disagreement amongst the harmonicians in determining these points, some making the interval of the extreme tones less than a diapason, others equal to it, and others again exceeding it; the later harmonicians, in particular, being fond of adding something to what had been admitted by those, who went before them. To bring these various opinions to some determination, he proposes the restitution of similitude in the hermosmenon, or harmonised melos, as the chief circumstance, by which to regulate the

(10) Ἐν παντὶ δὲ γένει ἀπὸ παντὸς φθογγοῦ διὰ τὸν ἔχον τὸ μέλος ἀγόμενον, καὶ ἐστὶ τὸ Καρπὸν, καὶ ἐστὶ τὸ ἔχον. ἢ τὸν τέταρτον τὸ ἔχον διὰ παντάραν, ἢ τὸν πέμπτον διὰ τοῦτο τὸ σύμμαχον λαμβάνεται. οὐ δέ αὐτὸν μετέρεσσα τοτὲν συμβάντη, ἐκριζλίς ἐστι τοὺς αὐτοὺς παντας, ἐν οἷς συμβάντες εἰσιν εἰσυμφώνων εἴναι κατὰ τὰς εἰρημένας αὐθίτας. Aristox. p. 54. edit. Meibom.

first limitation ; and this, he says, is effected by the diapason, for, at that distance, there was always a return of similar harmony ; so that the tone, that was a diapason distant from that first taken, was a repetition of it ; and the tone still farther distant, as for instance, at a diapason and diatessaron, the same with the tone distant a diatessaron only, and so of the rest. For a proof of this, he appeals to the practice of music ; where it was well known, that in such mutations, as were at the interval of a diapason, no one of the strings required new tuning, though in all other mutations some alterations were necessary. And hence he concludes, that those, who make the distance of the extreme tones less than the diapason, do not restore the hermosmenon, there being still other tones beyond the limit they assign, unlike to those before taken ; and that those, who exceed the diapason, admit redundancies, by repeating some of the harmonies before taken ; and further insists, that even they, who proceeded no farther than the diapason, were yet to blame, inasmuch as they took in the tone, that was a diapason distant from the first, since, in so doing, they admitted one redundancy, and thereby gave a handle to those, whom they charged with passing the proper limits for the modes, to accuse them, in turn, with being really the authors of this licence, since, if one useless tone be admitted, the same privilege may be fairly claimed for a greater number. This last argument seems levelled at the Aristoxenians, who admitted no more than thirteen modes ; because they would not exceed the diapason ; but whose Hyperphrygian was, according to this argument, a repetition of the Hypodorian. The author

author supports this argument still farther, by an appeal to the circumstance of the species of diapason, the sounds of which were eight, but the number of the species seven only, answering not to the number of terms in the division, but to that of the component ratios: for that the diapason taken from the gravest sound towards the grave, yielded the same species with the first diapason taken from the acutest sound towards the same parts, was out of dispute, it holding true universally, that whatever takes its beginning in the same manner from either of the extremes of the diapason, produces the same power. And here he leaves the first limitation, without expressly assigning the interval for the extreme tones; for the title of the chapter, which seems to fix it to a diapason, ought to be understood only in this sense, that it should not exceed it; which agrees with the reasoning in the chapter itself. As to the conclusion, which depended on the two other limitations, if I may venture to draw it for him, it will stand thus, that into what number soever of terms the diapason be divided, the distance for the extreme tones should be the interval between the first term and the last but one.

The first limitation being thus far considered, he proceeds to determine the next, upon which depended the number of the tones; and here he again opposes the Aristoxenians, rejecting, by his theory of this limitation, five of their thirteen modes, besides the Hyperphrygian, which stood condemned by the former one, and leaving only seven, according to the number of the species of diapason, which he proposes as the properest rule, by which to govern this limitation; and assigns for this the following reasons.

The

The number of the species of diapason was equal to that of the species of the two first consonances taken together, and the species of these last were taken according to the condition of the ratios in each, the number of which the very nature of them would not permit to be either increased or diminished. Now the tones contained within the diapason following the nature of the consonances, and being indeed established on their account, *viz.* that the whole systems might have consonant differences, he argues, that those, who were either for admitting more than seven, which was the number both of the species and of the ratios in the diapason, or for making all the excesses of the tones equal, were not to be assented to, since they could not assign any satisfactory reason, either for the equality of the increments in general, which, in the harmonic genus, was particularly inconvenient, or for fixing either on the tone, hemitone, or diesis, in particular, for the common excess, (from the superposition of one or other of which, they determined the number of tones, according to the number of such intervals contained within the diapason). For what was there to determine such a preference, when the consonance (meaning the diapason) was, as they themselves allowed, susceptible not only of all these excesses, but of many others, in the orders both of the genera and of the distances? Nor could they say, that such a magnitude divides the diapason exactly, and such another not exactly, or one, perhaps, into an even number of parts, and another into an uneven: for though the diapason was divided into six by the tone, into twelve by the hemitone, into eighteen by the third of the tone, and into twenty-four by the quarter,

quarter; yet, in all these divisions, there was a variation from the exact truth, even perceptible to the ear. All this reasoning is again manifestly levelled at the Aristoxenians, who, falsely esteeming the diapason to consist exactly of six tones, or twelve hemitones, had admitted thirteen modes, at the distance of a semitone from each other: and here we see the author still combats them fairly on the principles of the harmonic doctrine. But, to go on with his arguments; having thus fixed the number of the modes to seven only, he proceeds to consider the third limitation. It will be asked, says he, what are to be the excesses chosen for these seven modes, since the diapason cannot be divided into seven equal parts; and, if unequal intervals be admitted, there is still room for variety in the choice? In answer to this, he proposes, that the intervals in question shall be taken by means of the first consonances, diatessaron and diapente, and their differences or excesses, whatsoever they may be: for he argues, that the mutations, by consonant intervals, ought to be first established; and next to these, the mutations, by concinnous intervals. Those, who admitted eight tones, he tells us, had found their positions after the following manner. The Dorian, Phrygian, and Lydian, the three most antient, being first set at the distance of a tone from each other, they made the next mutation consonant, at a diatessaron from the Dorian, towards the acute, and at a limma from the Lydian, calling it Mixolydian; because it lay not at the distance of a tone from the Lydian, but only at the distance of a limma, or difference between ditonus and diatessaron; then this new mode having

the

the Dorian graver than it by a diatessaron, that the rest of the four might be attended with the like circumstance, they established the Hypolydian, Hypophrygian, and Hypodorian, a diatessaron graver respectively than the Lydian, Phrygian, and Dorian; and lastly, they placed the Hypermixolydian at a diapason from the Hypodorian, towards the acute, giving it that denomination from its position above the Mixolydian, misusing, as he tells us, the preposition *hypo* to signify the grave, and *hyper* to express the acute. But though the result of this method is the same with that of his own, excepting as to the Hypermixolydian, (which he excludes for the reason assigned in treating of the first limitation) yet he objects to it; because the concinnous intervals are first assumed, which ought to be taken by the consonances; and gives his own, which is by the continual addition of the consonance diatessaron, but, however, within the compass of the diapason. Wherefore, when such addition would exceed it, he directs taking the diapente in its stead, the contrary way; whereby the division will be kept within the limits assigned. This method, and its result, will perhaps be better understood, and will also be more succinctly couched in our modern expressions, in which I shall therefore give it, applying to it the corresponding characters of the Guidonian scale.

Having first taken the Mixolydian tone, which was the acutest of the seven, suppose in D, fall a fourth to A, for the Dorian; another fourth to E, for the Hypodorian; then, to avoid passing the bounds of the diapason, rise a fifth to B, for the Phrygian; fall a fourth again to *f*[#], for the Hypophrygian;

phrygian; rise a fifth to $c\#$, for the Lydian; and fall a fourth to $G\#$, for the Hypolydian.

By this method, the positions of the seven modes come out exactly, as I fixed them from Bacchius, in explaining the harmonic doctrine; and we see, that, for settling them, Ptolemey has really recourse to no other theory of the modes, than that admitted by those he contends with, though he makes the species of the consonances, and those of the diapason more particularly, the governing rule for fixing their positions, as the only means, by which the two doctrines could be made to coincide. But it remained, after thus settling the seven modes, to shew more fully the consequence of following the method of the Aristoxenians, and others, who divided the tonic spaces found by his method, and placed the modes in a semitonic succession, by which their number had been raised to thirteen, even within the compass of the diapason; and, in doing this, we shall find he ventures to assign the true reason for his reduction, which was grounded on the musical doctrine. This argument, which is contained in the eleventh chapter of his second book, being very remarkable, and seeming strongly to support the combination of the two doctrines in the diagram I have given of the seven modes, I shall give a translation of the whole chapter, lest I should be thought to strain his arguments in favour of the musical doctrine, which has been thought by many to have little or no relation to the modes, and which, if we except what this author has delivered, seems indeed, upon a slight examination, and comparison of the evidence, to have the weaker support.

Now, these being the tones we have established, it is plain, that a certain sound of the diapason is appropriated to the mese, in power of each, by reason of their being equal in number to the species. For a diapason being selected out of the middle parts of the perfect system ; that is, the parts from hypate meson in position to nete diezeugmenon, (because the voice is most pleased to be exercised about the middle melodies, seldom running to the extremes, because of the difficulty and constraint in immoderate intentions and remissions), the mese in power of the Mixolydian will be fitted to the place of paranete diezeugmenon, that the tone may, in this diapason, make the first species ; that of the Lydian, to the place of trite diezeugmenon, according to the second species ; that of the Phrygian, to the place of paramese, according to the third species ; that of the Dorian, to the place of the mese, making the fourth and middle spaces of the diapason ; that of the Hypolydian, to the place of lichanos meson, according to the fifth species ; that of the Hypophrygian, to the place of parhypate meson, according to the sixth species ; that of the Hypodorian, to the place of hypate meson, according to the seventh species ; that so it may be possible, in the alterations required for the tones, to keep some of the sounds of the system unmoved, for preserving the magnitude of the voice (meaning the pitch of the diapason), it being impossible for the same powers, in different tones, to fall upon the places of the same sounds. But, should we admit more tones than these, as they do, who augment their excesses by hemitones, the meses of two tones must, of necessity, be applied to the place of one sound ; so that,

in

in interchanging the tunings of those two tones, the whole system in each must be removed, not preserving any one of the preceding tensions in common, by which to regulate the proper [pitch] of the voice. For the mese in power of the Hypodorian, for instance, being fixed to hypate meson by position, and that of the Hypophrygian to parhypate meson, the tone taken between these two, and called by them the graver Hypophrygian, to distinguish it from the other acuter one, must have its mese either in hypate, as the Hypodorian, or in parhypate, as the acuter Hypophrygian; which being the case, when we interchange the tuning of two such tones, which use one common sound, this sound is indeed altered a hemitone in pitch, by intention or remission; but having the same power in each of the tones, *viz.* that of the mese, all the rest of the sounds are intended or remitted in like manner, for the sake of preserving the ratios to the mese, the same with those taken before the mutation, according to the genus common to both tones; so that this tone is not to be held different in species from the former, but the Hypodorian again, or the same Hypophrygian, only somewhat acuter or graver in its pitch. That these seven tones, therefore, are sufficient, and such as the ratios require, be it thus far declared (11).

With

(11) Δῆλον δὲ ὅτι, καὶ τούτων μὲν ὑποθεσμίνων ἡμῖν τὰν τόνων, τῆς καθ' ἔκαστον τῇ δυνάμει μέσος, ἵδιος τις γίνεται τῇ διὰ πασῶν φθόγγος, διὰ τὸ ισθεντον ἀντὸν τε καὶ τὸν ἐιδόν. Ἐκλαμβανομένη γὰρ τῇ διὰ πασῶν κατὰ τὰς μελαχύν πως τῷ τελεῖσθαι συνίμαζε τόπος τετέστι, τὸν ἀπὸ τῆς θέσεως τῶν μεσῶν ὑπάρχει ἐπὶ τὸν νίκτην διεζευγμένων ἔνεκα τῷ τὸν φωνὴν ἐμπριοχόρως ἀνατρέφεσσι καὶ παλαγίνεσσι πεεὶ τὰς μέσας μάλιστα μελωδίας ὀλιγάκις ἐπὶ τὰς ἄκρες ἐκβαίνει.

With this chapter he ends his doctrine of the modes, and of their reduction; and we see he here makes the musical doctrine of the species the basis of his theory, as far as concerns the rejecting the eight redundant modes; though, out of caution, and to obviate objections, he had established the seven upon the harmonic doctrine of the pitch of the

σαν, διὰ τὸ τῆς παρεῖ τὸ μέτειον χαλάσσεως ἢ κατατάσσεως ἐπίπονον καὶ θεοισμένον. Ἡ μὲν τῷ μεζολυθίῳ μέσον κατὰ τὸν δύναμιν, ἐφαρμόζεται τῷ τόπῳ τῆς παρανύτης τῶν διεζευγμένων ἢ' ὁ τόπος τοῦ πρώτον εἶδος, ἐν τῷ περιειρίῳ, ποιήσῃ τῷ διὰ πασῶν. Ἡ δὲ τὸ λυθίον, τῷ τόπῳ τῆς παρανύτης τῶν διεζευγμένων, κατὰ τὸ δύνατον εἶδος. Ἡ δὲ τὸ φρυγίον, τῷ τόπῳ τῆς παραμέσου, κατὰ τὸ τείτον εἶδος. Ἡ δὲ τὸ δωεῖκα, τῷ τόπῳ τῆς μέσου, ποιήσατο τὸ τέταρτον καὶ μέσον εἶδος τῷ διὰ πασῶν. Ἡ δὲ τὸ ὑπολυθίον, τῷ τόπῳ τῆς λιχανῆ τῶν μέσων, κατὰ τὸ πέμπτον εἶδος. Ἡ δὲ τὸ ὑποφρυγίον, τῷ τόπῳ τῆς παρυπάτης τῶν μέσων, κατὰ τὸ ἕκτον εἶδος. Ἡ δὲ τὸ ὑποδωεῖκα, τῷ τόπῳ τῆς τῶν μέσων ὑπάτης, κατὰ τὸ ἑξδόμον εἶδος. Ὡς τε δύναται τίνας ἐν τῷ σύγκριτοι τηρεῖσθαι φθόγκος ἀκούτης, ἐν ταῖς τῶν τόνου μεθαρμογαῖς, παρεφύλαξενται τῷ μέγεθῳ τῆς φωνῆς διὰ τὸ μηδέποτε τας ἐν διαφύρεις τόνοις ὁμοίας δύναμεις, τοῖς δὴ δύναται φθόγκον τόνοις πειπίπτειν. Πλειστον δὲ τῶν τόνων παρεῖ τέττας ὑποτιθεμένων ὁ ποιῶν οὐ ἐν τοῖς μηδεμίαις τὰς ὑπερχάρακας δύναται παρεῖνεις· ἀναγκαῖον ἔσαι, δύνο τόνων μέσας ἐνὸς φθόγκον τόπῳ παριθέματος εφαρμόζειν· ἡ δὲ ὅλα κινεῖσθαι τὰ συσήματα, κατὰ τὴν εἰς ἀλλήλας τῶν δύνο τόνων τόνον μεθαρμογὴν· μηκέτι τηρεῖσθαι κοινὴν τινὰ τὴν ἔξαρχην τόσην, ἢ παρεμβιηδόσεισθαι τὸ ίδιον τῆς φωνῆς. Τῆς μὲν δὲ τῷ ὑποδωεῖκα, φέρε ἐισπειν, τῇ δυνάμει μέσου, συνεζευγμένης τῇ κατὰ τὴν δέσιν τῶν μέσων ὑπάτη· Ἡ δὲ τῷ ὑποφρυγίον τῇ τῶν μέσων παριστάτη· τὸν λαμβανόμενον μεταξὺ τόνων, καλέμενον δὲ τῷ δύναται διερύτερον ὑποφρυγίον, παρεῖκαντον· ὁξύτερον, δέσσεται τὸν δύνατὸν μέσουν, ἥτοι κατὰ τὴν ὑπάτην ἔχειν, ὡς καὶ ὁ ὑποδωεῖκος· ἢ κατὰ τὸ παριστάτη, ὡς καὶ ὁ δύναται ὑποφρυγίος. Οὐ συμβαίνοντο, ἐπειδὴν εἰς ἀλλήλας μεθαρμόζωμενα τὰς τὴν κοινὴν φθόγκον ἐπειρόστας τόνους κινηθῆσεσθαι μὲν ἐποτέ ἐπιστάδεις ἢ χαλασσεῖς ἡμίσοντος τῷ δὲ τὸν δύνατὸν, ἐν ἐκατέρῳ δὲ τόνων, δύναμιν ἔχειν τητέστι· οὐδὲ μέσης ἀκολεύσθωσιν δε τῷ λοιπῷ δύναται φθόγκον ἐπιτάσσεις ἢ χαλάσσεις· ἔνεκα τῷ συμπρέν τὰς πορειῶν τῷ μέσου λόγοις, τὸς δύνατος πορειῶν τῷ μεζαλοθίῳ, κατὰ τὸ κοινὸν ἀμφοτέρων τῷ τόνων γένεθλος, λαμπανομίνοις. Ὡς τε μηδὲ ἐτερον ἔτι δόξαι τῷ ἐιδεῖ τὸν πορειῶν τῷ πρότερον ἀλλ' ὑποδωεῖκα παλιν, οὐδὲ δύναται ὑποφρυγίον, δέξαμεντερον τινὸς ἢ διαρφανότερον μόνον. Τὸ μὲν ἐν ἐναλογόν τε καὶ διλαρχέος τῷ ἐπίλατον, μεχεῖ τάτων ὑποδωεῖκα. Ptol. lib. ii. c. 11.

system.

system. That the force of his arguments in this chapter, and the result of admitting the eight modes, may be more plainly seen, I have annexed a second diagram of the species, as they lay in the spurious modes; by which it will appear, to which species in the genuine ones they severally answered; and the objection, raised against each of them by Ptolemey will become intelligible.

There is, however, an objection, to which this second diagram seems liable. It may be asked, if the Hypoionian mode, instanced by Ptolemey, could give either Hypodorian or Hypophrygian harmony, according as either the eighth or the ninth string was employed for its *mese*? and if the rest of the spurious modes were liable to a like alternative, what was it determined me in my choice of the two species, in the construction of the diagram? To which I answer, that the antients have decided for me as to five of them; for we find (12), that the Hypoionian was called the graver Hypophrygian; the Hypoæolian, the graver Hypolydian; the Ionian, the graver Phrygian; the Æolian, the graver Lydian; and the Hyperionian, the acuter Mixolydian. And this, by the way, furnishes us with an unanswerable argument of the antiquity of the doctrine enforced by Ptolemey, that the number of the modes ought not to exceed that of the species of the diapason; for these appellations, which were given to the modes long enough before Ptolemey flourished, can be accounted for on no other principle, but the supposing the species of

(12) Vide Euclid. *Introduct. Harm.* p. 19. v. 29. & seq. Arist. *Quint.* p. 23. v. 7. & seq.

diapason to have been considered as the essential characters of the modes; and that these five modes therefore, though they had a difference in pitch, were thought to be the same, as to their effects, with those, after which they were thus named. As to the other three, the Hyperphrygian, Hyperæolian, and Hyperlydian, their meses being respectively at the distance of an octave from the Hypodorian, Hypionian, and Hypophrygian, it was necessary to give them the same species with those three modes; for a transposition of an octave was always understood to give a return of the same harmony, as has been already shewn.

This second diagram, and that of the seven genuine modes, may be thought sufficient to render the subject intelligible: however, as the fifteen modes are parted in the two diagrams, and confined also to the compass of a diapason, for shewing the species, I have added a table, shewing the tuning of the fifteen strings of the lyre for all the modes. The letters of Guido's scale, placed within the squares, shew, in their horizontal orders, the tunings of all the strings for each mode; the two broader lines include the species of diapason; and the meses are distinguished by capital letters, by which means, the cases, where the same string is employed for the meses of two modes, appear at the first view; and the reasoning, upon which Ptolemy rejects the eight modes, is illustrated, so as to need no farther explanation.

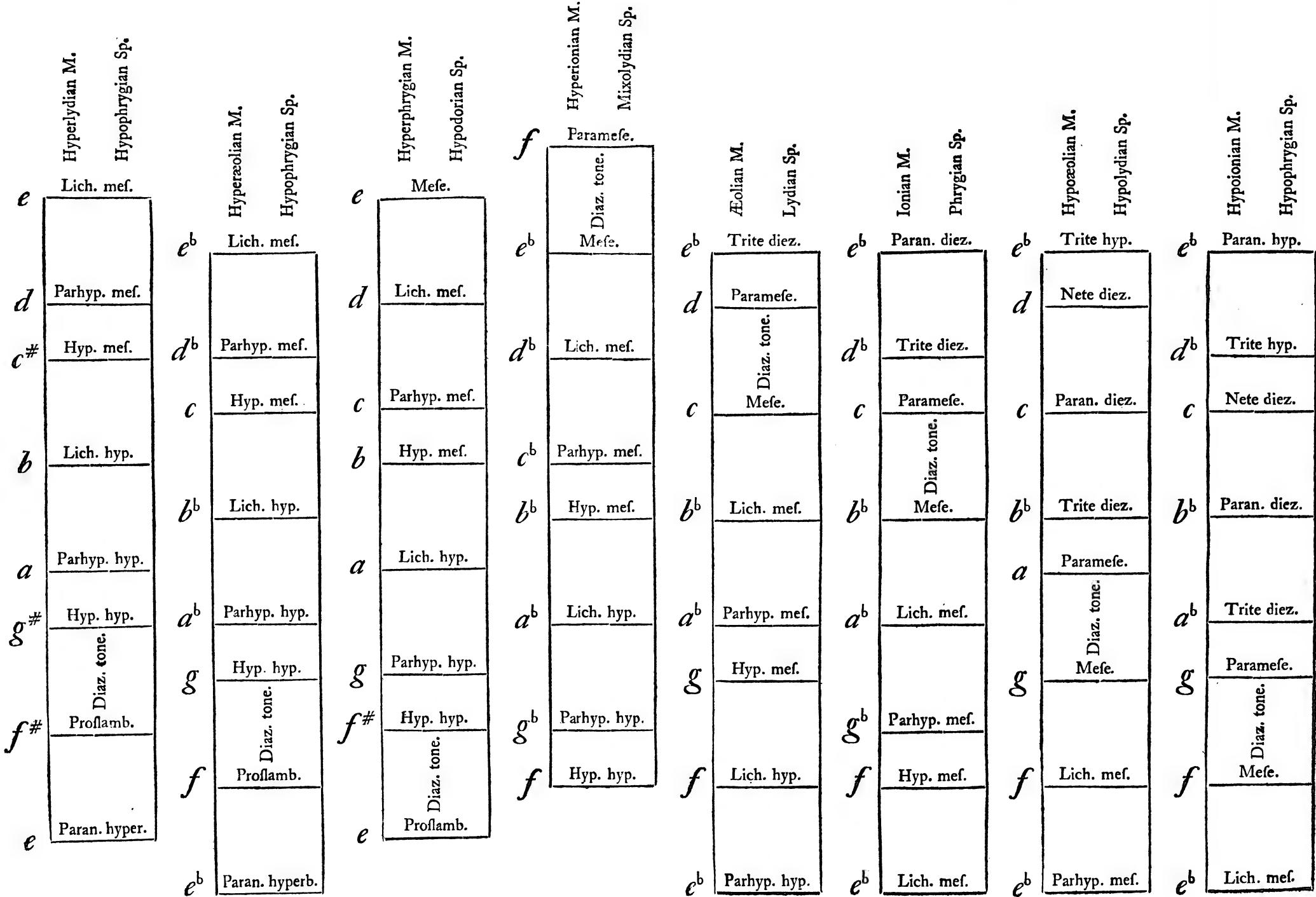
Having now gone through with what I proposed to explain under the three first heads, I come,

Fourthly,

A TABLE, shewing the Tuning of the STRINGS of the LYRE for every Mode.

15	Nete hyperbolæon.	a	a^b	a	b	a	a^b	a	a^b	a	a^b	a	a^b	a
14	Paranete hyperbolæon.	$g^{\#}$	g	$g^{\#}$	$g^{\#}$	g	g	$g^{\#}$	$g^{\#}$	g	$g^{\#}$	g	$g^{\#}$	g
13	Trite hyperbolæon.	$F^{\#}$	F	$f^{\#}$	g^b	f	$f^{\#}$	f	$f^{\#}$	f	$f^{\#}$	f	$f^{\#}$	$f^{\#}$
12	Nete diezeugmenon.	e	e^b	E	f	e	e	e^b	e	e^b	e	e^b	e	e^b
11	Paranete diezeugmenon.	d	d^b	d	E^b	D	$d^{\#}$	d	d^b	d	$d^{\#}$	d	d^b	d
10	Trite diezeugmenon.	$c^{\#}$	c	c	d^b	c	$C^{\#}$	C	$c^{\#}$	c	$c^{\#}$	c	$c^{\#}$	c
9	Paramæte.	b	b^b	b	c^b	b^b	b	b^b	B	B^b	b	b^b	b	b^b
8	Mæte.	a	a^b	a	b^b	a	a	a^b	a	a^b	A	$a^{\#}$	a	a^b
7	Lichanos meson.	$g^{\#}$	g	g	a^b	g	$g^{\#}$	g	g	g^b	g	$G^{\#}$	G	$g^{\#}$
6	Pathypate meson.	$f^{\#}$	f	$f^{\#}$	g^b	f	$f^{\#}$	f	$f^{\#}$	f	$f^{\#}$	f	$F^{\#}$	F
5	Hypate meson.	e	e^b	e	f	e	e	e^b	e	e^b	e	e^b	e	e^b
4	Lichanos hypaton.	d	d^b	d	e^b	d	$d^{\#}$	d	d^b	d	$d^{\#}$	d	d^b	d
3	Pathypate hypaton.	$c^{\#}$	c	c	d^b	c	$c^{\#}$	c	c	$c^{\#}$	c	$c^{\#}$	c	c
2	Hypate hypaton.	b	b^b	b	c^b	b^b	b	b^b	b	b^b	b	b^b	b	b^b
1	Prostambanomenos.	a	a^b	a	b^b	a	a	a^b	a	a^b	a	$a^{\#}$	a	a^b

DIAGRAM II. Of the Species of Diapason in the Eight Modes rejected by PTOLEMEY.



Fourthly, To point out something of the origin of the two doctrines.

The harmonic doctrine was, as I have shewn, expressly taught in harmonic; and therefore, to account for its reception, it will be necessary to consider the scope of that science.

The musical doctrine I have also shewn to have been explained in harmonic, as far as concerned the elementary principles of the species of diapason; but the application of those principles to the doctrine of the modes was not taught therein, being reserved for melopœia, a science, that looked higher than harmonic, and considered the use of the elements, when in the hands of the poet or musician. It is to this science, therefore, that we must look for the origin of the musical doctrine.

But, before I consider the scope of either of these sciences, it will be necessary to shew my reasons for separating them, since they were blended by the Aristoxenians, as has been shewn above. For this purpose, we must have recourse to the division of music, the mother science; which, as treated by the antients, comprehended all, that the moderns now understand by music and poetry. Its first general division, according to Aristides Quintilianus (13), was into theoretic and practic. The theoretic was subdivided into natural and artificial; the latter of which was again subdivided into harmonic, rhythmic, and metric;

(13) *De Musica*, p. 7. See also Meibomius on the passage, who has embraced the division of Aristides, in the following table.

metric; which three sciences more particularly contained the poets elements, as teaching the grounds of tune, time, and verse. But nothing less than a competent knowlege of every branch of the mother science could carry with it the respected title of *μετρικός*, the musician. To harmonic, rhythmic, and metric, in the theoretic, respectively answered melopœia, rhythmopœia, and poetic, in the practic. In this author's division therefore, we see, that harmonic and melopœia are distinguished, even by the first general division. Of the propriety of this even the Aristoxenians seem to have been sensible; since, in order to justify their blending them, they have defined harmonic as a science, both theoretic and practic (14). And Aristoxenus himself, in the fragments we have under the false title of his three books of harmonic elements, seems to assign such bounds to harmonic, as might well be understood to exclude

MUSICÆ	alia est pars Theoretica, cujus rursus partes duæ	Physica, quæ dividitur in Artificialis, quæ dividitur in	Arithmeticanam, Physicam generi cognominem.
	Harmonicam, Rhythmicam, Metricam.		
aliam Practica, cujus item partes duæ	Usualis, cujus partes	Melopœia, Rhythmopœia, Poësis.	
	Enarrativa, cujus partes		Ornamentica, Cœlestia, Hypocritica.

(14) Ἀρμονικὴ ἐστιν ἐπιστῆμα θεωρητικὴ καὶ περιῆλικὴ τὸ τῆς ἡρμονίας φύσεως. Euclid. Introd. Harmon. initio.

melopœia (15). We have Plutarch also on our side, who, in a passage of his dialogue on music, which I shall have occasion to cite, amongst other proofs, enumerates only the first six parts of harmoniac, leaving melopœia out of his division. For this Meibomius blames him (16), but too hastily; for had the learned critic considered the whole passage, he must have seen, that the omission was not through ignorance, but design, the author being there expressly arguing for the confining of harmonic within its proper bounds. However, whether the Aristoxenians were right or wrong, in including melopœia in harmonic, my argument seems not materially affected by it; for they gave it only as a last division, to be taught after all the rest had been inculcated; and they agreed in defining it to be the use of the harmonic elements, according to the propriety of each subject (17): which is distinction enough for the use I propose to make of it.

Having thus far justified my dividing these sciences, I shall now consider the scope of each; which

(15) Τῆς περὶ μέλες ἐπιστήμης πολυμερῆς ἔστι, καὶ διηριζόμενη ἔις πλεις ἰδέας, μίαν τινὰ ἀντὶ μετολαβεῖν δεῖ, τὴν ἀρμονικὴν καλεμένην, εἰςαὶ περιγραμμέτας, τῷτε τάξει πρώτην ἔστι, ἔχοσδν τε δύναμιν γοχεώδην. Τυγχάνει γδ' ἔστι πρώτη τῇ διεργίαιν τάῦτα δέ ἔστιν ὅσα συντέλειν πρός τὸν συστημάτων τε καὶ τὸν θεωρίαν. Πλεονάκις γδ' μηδέν πορρωτέρω τέτον αἰξιν παρ' αὐτῷ τῷ εἰρημένῳ ἔχοντο διπλί- μιν τέλος τῷ τέτον ἔστι τὸ περιγραμμέτας ταύτης. Aristox. p. 1. init.

(16) Plutarchus dialogo de Musica sex tantum priores turbato etiam ordine recenset, cum tamen crebram μελοποίης mentionem injiciat, adeoque, non una ratione excusari illud potest. Not. in Gaudientium, p. 30.

(17) Μελοποία δέ ἔστι χρῆσις τῆς ποσοειμένων τῇ ἀρμονικῇ πραγματείᾳ, πρὸς τὸ ὄκτον ἐκτιντούσαν ποσότητας. Euclid. Introd. Harmon. p. 2. v. 5. & p. 22. v. 18.

will lead us to the origin of the doctrines they contained.

The object of melopœia was propriety in the use of the harmonic elements, as appears from the definition just cited. In what this propriety consisted, it is difficult to know, as no collection of the rules of this science is come down to us: it is not to be learnt from the harmonic writers, who treat very slightly of this branch; and those of them, who are the fullest upon it, as Aristides Quintilianus and Manuel Briennius, wrote in later times, when the fashion of music was changed, and a new kind of melopœia prevailed, with the rules of which the earlier musicians could hardly have been acquainted; as, on the other hand, many of the earlier rules must have been forgot, or, in a great measure, disused. There is more light to be procured from the dialogue of Plutarch, and some others, who speak occasionally of the practice of music. I do not propose to collect any thing here upon this subject, as, indeed, there does not seem to be sufficient materials left us for a thorough explanation of it, which would require no less than a complete history of the science of its music, and its improvements: it is sufficient for my purpose to say, that, in the earlier times, when the best music is supposed to have prevailed, the genera, modes, rhythmæ, metres, &c. were not employed indiscriminately, nor even left to the discretion of the musician, but were under particular restrictions, which confined them to the arguments, to which they were held respectively the best adapted; and that it was from the mixture of these ingredients, that arose the ethic character of the composition. Hence the several nomi-

nomi took their rise; of which there is, in the dialogue of Plutarch, an ample account. As what I am now advancing cannot but be well known, I need look no farther for the proof of it, than to a passage of Plato's third book of laws, where he complains of a licence beginning even in his time to the prejudice of the science. Speaking of times past,

Our music (says he) was then divided according to certain species, and figures thereof. Prayers to the gods were one species of song, to which they gave the name of hymns: opposed to this was another species, which, in particular, might be called threni; another, pæones; and another, the birth of Dionysius, which I hold to be the dithyrambus: there were also citharœdic nomi, so called, as being still another song. These, and some others, being prescribed, it was not allowable to use one species of melos for another.—But afterwards, in process of time, the poets first introduced an unlearned licence, being poetic by nature, but unskilled in the rules of the science, trampling upon its laws, over attentive to please, mixing the threni with the hymns, and the pæones with the dithyrambi, imitating the music of the flute upon the cithara, and confounding all things with all, &c. (18).

This

(18) Διηρημένη γάρ τότε ήν διμήνη μετοκή κατ' αὐλην τε ἐσαντ' ἀπῆλα καὶ χήμελα καὶ τί ήν εἰδόθε φρέσης ἐνυάλιος φρέσης θεούς: ὅρμα δὲ ὅμιλοι ἐπικάλυψιοι καὶ τέτω, δὲ τὸ ἐναντίον ήν φρέσης ἔτερον εἰδόθε. Θρίνας δὲ τις ἀντίτερος μάλιστα ἐκάλεσε καὶ πατέντες, ἔτερον καὶ ἀλλο Διονύσος γένεσις, οἵμαι, διδύσερμοι λεγόμενοι τόμεις τε ἀντίτοτε τένυμα ἐκάλενται διδύλιοι ὡς τινα ἔτερον ἐπέλεγον δὲ κιθαρωδικός. Τέτων δὲ διδύλιαγμένων καὶ ἀλλων τινων ἐκ τοινιν ἀλλοι εἰς ἀλλο καταχρῆσθαι μέλεις εἰδόθε. —Μετὰ δὲ ταῦτα περισσότεροι τοιχοῖς, ἀρχοντεσ ποτὲ τοις μεταφοροποιίας

This passage, with what has been said, being sufficient to give a general idea of the scope of melopœia, I shall pass to that of harmonic.

We have already seen, that the theoretic division of music was by the author, whose distribution I have followed, subdivided into natural and artificial, and that harmonic came under the latter. The antients, indeed, seem not all to have treated the science under such narrow limits, the physical properties of sound, the ratios of intervals, &c. appearing to have been considered therein, by the Pythagorean and other schools, as well as the structure of the systems in use. But not to stop at this objection, which is not very material, thus far must be allowed, that harmonic, as to the greatest part of its scope, was an artificial science, its most considerable object being to explain and teach the denominations, positions, powers, &c. of the sounds of the system, and all other inventions in use, for facilitating the study of music, or bringing it to greater perfection. Now, in this short view of the science, which is sufficient for our purpose, we may already begin to account for the difference between its doctrines and those of melopœia, artificial sciences being but too prone to admit doctrines for convenience, that are repugnant to the truth. This was indeed the case with harmonic, as the two doctrines of the tones sufficiently testify, the origin of which I shall now consider.

τοιμαῖς τοιμαῖς ἐγγυοῦτε, φύεις ἐπι τοιμαῖς, σύγνεμον δὲ τοῖς τὸ δίκαιον τὸ μέσον καὶ τὸ ἑορτικόν, οὐκχεινούσεις, καὶ μᾶλλον τὸ δίκαιον παλεύεινδον τὸ μέσον, περιεχούσεις δὲ Θρησκείας ὑμνοῖς καὶ παιῶντας διδύεινδονς: καὶ αὐλαδίας δὲ τὸ ποιηταριαῖς μαρέμενον, καὶ πάντας τὰ ταῦτα ξυνάγοντες. Plat. de Legibus, lib. iii.

The

The musical doctrine I look upon as the most ancient, and that which exhibited the modes in their proper character; for which reason, it could not avoid making a part, and probably the most essential one, of the doctrines of melopœia. The precise time when it first came into use, I pretend not, in the midst of uncertainties, to be able to determine; but we may, perhaps, be near the truth, if we refer its origin to the age of Pythagoras, if the eighth string of the lyre was really, as we are told, the addition of that philosopher. The story of his discovering, at a forge, the ratios of hypate, mese, paramese, and nete, is well known. These ratios, which gave rise to the harmonic proportion, and the numbers of which were so vainly applied afterwards, by philosophers, to all the parts of the universe, were drawn from the Dorian species of diapason, which we cannot suppose to have been well understood, till its form existed upon the instrument. What doctrine of the modes prevailed, before the addition of the eighth string, we can only guess at; for it was a question, even with Aristotle (19), how the heptachord lyre had been adjusted; and Nichomachus speaks of that instrument so

(19) Διὰ τὶ οἱ ἀρχαῖοι ἐπιτιχέρδεις ἀρμονίας ποιῆταις τὸν θεάτρον, ἀλλ᾽ εἰς τὸν μίτιν κατίλιπον; πότερον τέτο Ψεῦδθ, ἀμφοτέρες γένος κατέλιπον, τὸ δὲ τείτοντες; ή γάρ, ἀλλ᾽ ὅτι οἱ Σαριτέραιοι ιχθύες τὸν ὁξυτέρον φθόγγον, ὡς μᾶλλον ή νασάτην ἀπεδίδει τὸν ἀντίφεων ή ή νετονιστεῖ τὸ οὖν δινάμεως μᾶλλον. τὸ δὲ Σαρὺν ταῖς φεύγεσσι. Aristot.

Probl. sect. 19. qu. 7.

Διέ τι οι ἀρχαῖοι ἐσταχέρδες ποιήσεις τὰς ἀρμονίας τὸν ωράτων ἀλλὰ τὸν νύκτην κατέλιπον; Η οὐ τὸν ωράτων, ἀλλὰ τὸν νὺξ καλεμένην ἀπαρίστουν ἀστέρων καὶ τὸ τοιούτον διάστημα, ἐχρῆντο δὲ τῷ ἐχάρτῃ μέσον τῆς ἡγετοῦ τὸ δὲ νύκτινον πυκνόν, διό καὶ μέσον ἀντίτιν προστηγάρευσαν; Η δὲ τὸ μέσον τελεχύρδες τελευτὴ, τὸ δὲ κατὰ τὸν ἀρχήν, καὶ μέσον τοῦτο λόγον τὸν φέρει τοιούτων. Probl. sect. 19. qu. 48.

confusedly,

confusedly, as to have given room for a supposition (20), that it had received two forms, the seven strings answering, in the oldest form, to our notes *e, f, g, a, bb, c, d*, and in the new one, to *e, f, g, a, b, d, e*. However this may have been, neither the musical nor the harmonic doctrines could be then in use, exactly as they were taught in after times; and the probability seems to be, that the modes were in those days characterized by the species of the lesser consonances, diatessaron and diapente; but the theory of the Dorian species of diapason, we may be sure, took place about the time, when the lyre was brought to that compass; and the other species, though they might have existed before, in the melody of particular instruments; as for instance, the barbarous Phrygian, upon its flute, could hardly have been taken into the Greek theories of the science, till the extension of their own favourite instrument had brought the diapason under consideration: so that the origin of the musical doctrine of the modes, is, with great probability, to be referred to this improvement of the lyre.

I come now to the harmonic doctrine, for the origin of which we must look to the invention of the system. The greater perfect system, upon whose pitch the modes depended, by the harmonic doctrine, consisted, as I have already shewn, of fifteen sounds, answerable to those of the lyre; and it is reasonable

(20) *Ut ex his difficultatibus nos expediamus, duas, non opiniones, sed aetates statuere debemus, quibus aliter obtinuerint intervalla in septem chordis.* Meibomius in Nichomachum, p. 52. See also Nichomachus, p. 9. v. 14. & seq. & p. 17. v. 24. & seq.

to think, that the structure of it was not settled, till the instrument had been again extended to the compass of a disdiapason, by the additions of the tetrachords hyperbolæon and hypaton, and of the sound proflambanomenos: for this change the age of Alexander the Great may, perhaps, be a probable æra; for, in the musical problems of Aristotle, I observe no mention of the new tetrachords, though many of the questions concern the strings of the lyre; and yet there is no doubt of their being in use in the time of Aristoxenus, his disciple. Should I be near the truth in this, the musical doctrine will then appear to have been earlier than the harmonic, by the whole period from Pythagoras to Alexander. But, without being solicitous about the precise time when the harmonic doctrine was introduced, I shall, with more certainty, endeavour to point out what must have given occasion to it.

The study of the music of the antients, though they seem not to have much used composition in parts, must yet have been very perplexing, from the variety only of the tones and genera; and some help might well be thought necessary, even in the time of the octachord lyre. But when seven new strings were given to the instrument, and these placed not all at one end, but three at the acute, and four at the grave, the eight old strings, upon which the characteristic species of melody for each mode had been always exhibited, became confounded by these additions; and possessing now the center of the lyre, it was difficult to distinguish them, and to preserve for each mode its proper character as before. This difficulty must also have been increased, by the change introduced

introduced in the practice of the science; for both the players and composers, having now a greater latitude, would not fail to take advantage of the enlargement; and though the skilful among them might, in their excursions upon the new strings, preserve a due attention to the proper characters of the several modes, yet the melody peculiar to each could not be so easily comprehended, when carried beyond its usual limits. An artificial help, therefore, to the learner, was now become indispensably necessary; and with this view, I make no doubt, but that the system was invented. It was, indeed, admirably well contrived for the purpose; for its succession being the same with that of the lyre, in its Dorian tuning, with which the Greeks must have been the best acquainted, as being the proper mode of their favourite instrument, it was the most easy to be learnt and retained, and the knowlege of this succession was all now required; for, by imagining only the system removed to some other pitch, and tuning all the strings in the same relations to a new mese, the melody of the old eight strings was thereby changed, and a new species of diapason gained thereon, without the trouble of studying the musical doctrine, which was now left to the musician, or melopœius, who was answerable for the choice of the successions he selected for his various subjects, whilst the harmonician followed him through the intricacies of his compositions, by the easier method of the transposition of the system. And this I apprehend to have been the origin, both of the system itself, and of the harmonic doctrine of the tones. But now, as it often happens, what was designed for the improvement of the science, became,

in time, the ruin of it; for, after the reception of the disdiapason system, the elementary treatises, as we see by what is left to us of them, became filled with this new doctrine of the parts and relations of the system, of its transpositions, of the positions of the mese, of sounds in power, and sound by position, and many other doctrines flowing from the same source, till, in time, the system itself came to be considered as the true type of a mode; and a number of new modes were introduced, that were grounded on no other principle than this, which I scruple not to call a false doctrine of them, though the antients admitted it for convenience, as I have shewn, and thereby almost lost their impressions of the new one.

Having thus pointed out the origin of these two doctrines, as far as was possible, from a general view of them, and without entering into a critical examination of the many passages of the antients, that might help us to greater certainty, I shall now proceed,

Fifthly, To shew how far the preceding explanations may be supported by arguments, or warranted by the testimony of antient writers.

Here I must repeat, that the harmonic doctrine of the tones, as I have explained it, is found, expressly delivered under its proper head, in almost every writer on the subject; and that the doctrine of the species of diapason is found also in the harmonic treatises, though not under the head of tones, nor expressly applied to them. Now, this being the case, I shall have no occasion to waste time in bringing

particular proofs, to support the explanations I have given of these two doctrines separately. What immediately lies upon me is, to prove, that the doctrine of the species of diapason had a connection with the modes; and to justify the manner, in which I have combined the two doctrines in the canon, and in the diagrams framed from it. With this view, therefore, I shall direct my arguments to the proving of the five following points.

1. That the doctrine of the species of diapason was a doctrine of the modes.
2. That this doctrine was not distinct from, nor independent of, the harmonic, but so connected with it, that a mutation, according to the one, produced the alteration required by the other.
3. That the species of diapason, as taken practically on the lyre, lay all at the same pitch.
4. That this pitch was the diapason, between the strings hypate meson and nete diezeugmenon, as they stand in the diagram.
5. I shall endeavour to shew, that it was the musical doctrine, and not the harmonic, that exhibited the true character of the modes, as considered in respect to their effects.

To begin with the first point. That the doctrine of the species of diapason was a doctrine of the modes, might, perhaps, be inferred from some of the definitions given of a mode; but as these definitions are mostly intermixed with, if not drawn solely from, the harmonic doctrine, and hence have given room for disputes, I shall rest this point upon three arguments, in which the definitions are not concerned.

First,

First, Because the species are denominated after seven of the modes, which could hardly have arisen from any other cause, than their connection with them.

2dly, Because the whole reasoning of Ptolemy, in the sixth, seventh, eighth, ninth, tenth, and eleventh chapters, of his second book, tends to reduce the modes to the number of the species of the diapason; which, as far as his opinion goes, is an express confirmation, that the musical doctrine was a doctrine of the modes.

3dly, Because Ptolemy is not single in this opinion, as some may have thought, but is supported in it by the Aristoxenian writers, who, though they admitted thirteen modes, upon the false principle of the harmonic doctrine, did, in fact, reduce them to eight, on the very principle of Ptolemy, calling the Hyperionian mode, which gave the same species with the Mixolydian, the acuter Mixolydian; and calling also the Æolian, the graver Lydian; the Ionian, the graver Phrygian; the Hypoæolian, the graver Hypolydian; and the Hypoionian, the graver Hypophrygian; the former of all which modes gave, respectively, the same species with the latter. So that, to make their doctrine answer to that of Ptolemy, there wanted but the reduction of one mode more, which was their Hyperphrygian. And it is not to be conceived, but that they saw this mode also to be a repetition of the Hypodorian; but as this repetition was at the distance of an octave, and the other five were repeated at the difference only of a semitone in pitch, they could not have called this the acuter Hypodorian, without using the same expression in too great a latitude

tude of sense. And this might be the reason why they omitted taking notice of that circumstance attending this mode; though we might perhaps, with safety to the argument, go a step farther, and suppose, that the Aristoxenians might think a difference of an octave in pitch worthy of a distinct denomination, though they would not allow it to that of a semitone. And this is the more probable, as we find they did not absolutely reject these modes, as Ptolemy did, but admitted them upon the principles of the harmonic doctrine, though, by their denominating five of them from the genuine modes, it is plain they acknowledged them to be superfluous, in respect to the musical. I cannot say more to this point, without defrauding the subsequent ones; and I shall therefore leave it; with this remark, that whatever is proved of the subsequent points, and especially of the fifth, must hold true of this, *à fortiori*; so that it may really be said to have the support of the whole testimony.

2. To the second point, the first diagram speaks very strongly; for had the two doctrines no relation to each other, no such coincidence, as is there found, could have been expected, in the result of their combination; and this proof, from the coincidence of the doctrines in the diagram, becomes much stronger, if we attend to these two circumstances. First, That in the canon, upon which the diagram has been constructed, there is no strain of either doctrine, but a plain and natural combination of them, as they are stated separately by the antient writers. And secondly, That the species of diapason, as brought out by this combination, all fall upon the strings of the old octachord

octachord lyre, where it was natural to expect them; for when the lyre had but eight strings, the species could be taken no where else; and it cannot be thought, but that, after the extension of the instrument, they were taken at the same pitch as before, unless we should suppose, that the new strings brought with them an immediate change, both of the theory and practice of the science, which is most improbable. We see our modern harpsichords have more keys given to them than those of the last century; and yet neither the positions of the cliffs, nor any other circumstances attending our theories of the science, have been altered by them. But that this point may not rest wholly on the circumstances of the diagram, I shall produce four passages, that plainly shew the relation between the two doctrines. The first from Aristoxenus.

“ Now, as some of those [systems] which we employ in music, are simple, and others mutable, we must treat of mutation; and first of this, what mutation is, and how it is accomplished; now, I say, there happens, as it were, a pathos in the melody; afterwards, how many mutations there are in all, and according to what intervals (21).”

In this passage, the author is speaking of the sixth division of harmonic, which was mutation; and more particularly of mutation with respect to tone, which, in this division, was always treated upon the

(21) Ἐπεὶ δὲ τὸ μελοθυμένον ἐστὶ τὰ τοῦ ἀπλῶ, τὰ δὲ ἀριστάβολα, [corrigere, ἀμετάβολα] ἀφὶ μελαβοῦς ἀντὶ τῶν λεκτέον ἀράτον μὲν αὐτὸν, τί ποτε ἐσίν οὐ μελαβοῦ, καὶ πάς γινόμενον. Λέγω δὲ οὗτος ταῦτα συμβαίνοντα ἐν τῇ τοῦ μελωδίας τάξει. Ἐπειδὴ πότες ἐσίν αἱ πάσαι μελαβοῦ, καὶ κατὰ πότα διατίμηται. Aristox. p. 38. v. 7.

principle

principle of the harmonic doctrine, and is so here; but he tells us, there was a pathos in the melody, which can only relate to the musical doctrine, and therefore shews their connection. In the next passage, from Aristides Quintilianus, it is more plainly hinted at.

“ For if a certain type of the voice follows each system, it is manifest, that the species of the melos will be altered with the harmonics (22).”

But the two following passages from Ptolemy will put the matter out of dispute.

“ For we are not to imagine this constitution of the mutation, according to the tone, established for sake of graver or acuter voices, (since the intension, or again the remission of whole instruments, suffices for such a difference, no alteration being produced in respect of the melos, the whole being executed by performers of graver or acuter voices); but with this view, that the same melos, begun by the same voice, now from acuter places, and now from graver, may produce a certain change of ethos; because that in the permutations of the tones, the extremities of the voice do not answer to both the extremities of the melos; but in one, the extremity of the voice always falls short of that of the melos; and in the other, the extremity of the melos of that of the voice: so as that the same melos, which at first (meaning in the Dorian) answered to the compass of the voice, now falling short

(22) Εἰς γέδειον συστήματι καὶ ποιός τις ἐπακολεύει τὸ φωνῆς τύπον δῆλον ἀσ αἴμα τὴν ἀρμονίαν καὶ τὸ τῷ μέλει τοῦδε ἀλλοιωθήσεται. Aristid. Quintil. p. 24. v. ult.

of it, and now again exceeding it, may give to the ear the impression of another mode (23)."

" For of the mutations in respect to tone, so called, there are two principal differences, the one by which we run through the whole melos in an acuter tension, or again in a graver, preserving always the succession of the species. The other, by which there is an alteration, not of the whole melos in its tension, but only of a part thereof, from the succession it set out with. Wherefore, this last might be called rather a mutation of the melos, than of the tone; for, according to the former, the melos is not altered, but the tone (tension) of the whole; whereas, according to the latter, the melos varies from its proper order, and the tension varies not as tension, but as on account of the melos. Hence the former does not strike the sense with an idea of that alteration, according to power, by which the ethos is changed, but only of an alteration in respect to the being acuter or graver; whereas the latter causes the sense to drop from the usual and expected melos, the succession being preserved some time, and then making a tran-

(23) Όυδὲ γὰρ ἔνεκεν τὸ Σαρυτέρων οὐ δέξιτέρων φωνῶν ἔνεργιαν ἀν τὴν σύστασιν τὸ κατὰ τὸ τόνον μελαχολίης γεγεννημένην. ὅποτε πρὸς τὴν τοιάντινην διαφοράν οὐ τὸ ὄργυνταν ὄλων ἐπτετοι, οὐ τελιγράφησις ἀποτελεσμάτική, μηδεμάς γε ἀναδιλλαγῆς πρὶν τὸ μέλος ἀποτελεσμάτική, ὅταν ὄλων ὄροισις ὑπὸ τὸ Σαρυφανοτέρων οὐ τὸ δέξιφανοτέρων ἀγονισῶν διαφράσινται ἀλλὰ ἔνεκα τὸ κατὰ τὴν μίαν φωνὴν τὸ ἀντὸ μέλος ὅποτε μὲν ὑπὸ τὸ δέξιτέρων τόπων ἀρχόμενον, ποτὲ δὲ ὑπὸ τὸ Σαρυτέρων, τερπίν τινα τὸ ἄδειον ἀποβλέπον τὸ μικρέτι πρὸς ἐκπεραγα τὰ πίεργα τὰ μέλεις συναπτίζεσθαι τὰ τὸ φωνῆς εἰ τὸ τόνον ἀναδιλλαγῆς· ἀλλ’ δει περιπλανήγεν, ἐπὶ μὲν θετέσσα, τὸ δὲ φωνῆς πέρης τὰ τὰ μέλεις· ἐπὶ δὲ τὰ ἐγαντία, τὸ τὰ μέλεις πέρης τὰ τὸ φωνῆς· ὃσης τὸ δέξιαρχῆς ἐφαρμόσαν τὴν διασάσσει τὸ φωνῆς μέλος, πηδὲ μὲν ἀπολεῖται εἰ τὸ μελαχολίης, πηδὲ δὲ ἐπιλαμβάνον, ἐπέρει πῆδες φαγασίαν παρέχει τὸ ἀκοσίον. Ptol. Harm. lib. ii. c. 7.

sition to another species, whether according to genus or tension (24)."

3. The third point will receive much support from these two considerations; first, That diapasons, variously divided and variously bounded, also seem to form a more complicated theory, than can well be supposed to have prevailed in early times, when music had not yet lost its natural simplicity; and secondly, That the compass of the instrument, in its octachord state, would not admit of any variation, in respect to the bounding sounds. But there is testimony to this point also: I shall cite one pretty remarkable passage, from Aristides Quintilianus, which will be sufficient, as the proof of the next point necessarily carries this along with it. Aristides, who, in his explanations of the harmonic doctrines, follows the method of the Aristoxenians, coming under the head of systems, to treat of the species of diapason, after explaining their situation in the immutable system, and assigning their denominations, immediately subjoins:

" Hence it is plain, that if we make our first sign the same, though denominated in different cases from

(24) Εἰσὶ δὲ καὶ παρεὶ τὸ ἔτον τεγμένων τόνον, μελαῖσιν δύο πρώταις διαφορέσιν μία μὲν καθ' ἦν ὅλον τὸ μέλος ἐξυτέρα πάσει διέξιμον, οὐ πάλιν ἐσυτέρα, τηρίσεις τὸ διὰ παντὸν τὸ ἐπίκεις αἰώλεων δευτέρα δὲ, καθ' ἦν ὑπὸ ὅλον τὸ μέλος ἐξαλλάσσεις τῇ τάσει μέσης δὲ τι παρεὶ τὴν ἐξαρχῆς αἰώλεων διὸ καὶ καλοῖτο ἀντὶ τοῦ μέλους, τὸ μέλος μᾶλλον, οὐ τὸ τόνον μελαῖσι. Κατὰ δὲ ταῦτην μὲν γὰρ ἐκ αἰώλεων τὸ μέλος, μᾶλλον δὲ τὸ τόνον κατὰ ταῦτην δὲ τὸ μέλος ἐνέργειας τὸ δικέντας τάξεως οὐ δὲ τάσεις, ὑπὸ δὲ τάσεις, μᾶλλον δὲ ἐνεκα τὸ μέλος. οὐδὲν δὲ ταῦτην μὲν εἰς ἐμποιεῖται διαδοσοῖς φαντασίαις ἐπεργάτησιν τὸ κατὰ τὴν δύναμιν, οὐδὲν δὲ κινεῖται τὸ πῦρ, μᾶλλον μόνης τῆς κατὰ τὸ δέκατον ἐσυτέρου τὸ ἐσυτέρον ἀντὶ τοῦ μέλους, ὅταν ἐπὶ πλέον μὲν συνεργίαις τὸ ἀνόλεων, μελαῖσιν δὲ τὸ πῦρ ἐπεργάτησιν τὸ πῦρ, οὐδὲν δὲ τὸ γένος, οὐδὲν δὲ τάσιν. Ptol. Harm. lib. ii. cap. 6.

a different power of sound, the quality of the harmony will become manifest, from the succession of the sounds in order (25).

In this passage, it is to be observed, that the term *σημεῖον*, a sign, signifies a musical character, such as the antients used to write over the words of a song, to express the air, or tune; and that each of these characters represented not a sound of the system, subject to transposition, but, like the notes of our gamut, a sound of a certain pitch, or at least liable to very small variations only, from the generic differences. The term, therefore, is properly used here by Aristides, in opposition to *φθόγγος*, a sound of the system, whose pitch depended on the mode in which it was employed. As to the expression, quality of the harmony, it evidently respects the species of diapason; so that the author plainly means to tell us, that if we begin a diapason always with the same note, the succession of its sounds, that is, the manner in which it is divided, will determine the species: and so far he speaks to our purpose. But this point will receive farther proof, from what we shall say upon the next.

4. The fourth point being the natural result of the combination of the two doctrines, carries a sort of conviction with it; and the stronger, as not only the seven modes, but the whole fifteen, assist the proof, as will appear, on examining the table I have given of them: for there the sounds lying between the

(25) Ἐκ δὴ τέττα φανερὸν, αἱς καὶ ταῦτὸν ἀποδείνοις σημεῖον πρῶτον, ἄλλοις ἄλλη δυνάμει φθόγγον καίνομενούσιν, ἐπὶ τούτης ἡ ἐρεῖται φθόγγων ἀκολούθια τὴν τῆς ἀρμονίας ποιότητα φανερού γνωσται συμβάντες. Arist. Quint. p. 18. v. 7.

strings hypate meson and nete diezeugmenon fall out so, as to give the proper species for every mode ; which circumstance will not attend any other boundaries, common or varying, without altering the positions of the mese, and thereby disturbing the harmonic doctrine. But we have from Ptolemy sufficient testimony to this point. In the eleventh chapter of his second book, of which I have given a translation above, we see, that the diapason in question is chosen by him, to exhibit the divisions, that belong to the several species. 'Tis true, he seems to insinuate, that any other diapason might have been chosen, were it not for the difficulty the voice finds in running to the extremes : and in this, as a theorist, he is right ; for musical relations and proportions, considered as objects of mere speculation, may be conceived at any pitch ; but in the case before us, it was the practice of the instrument, that governed the theory. The pitch of the lyre had been made to answer to the double octave of the human voice ; the pitch of the system, in the Dorian mode, answered to that of the lyre ; and, in every other mode, the difference in pitch from that of the Dorian was determined. Now, under such limitations, that took their rise from practical music, it is evident, that no other diapason, but that instanced by Ptolemy, could have served his purpose.

But that the boundary of the species is rightly adjusted in the diagram, there is yet another strong testimony, from the tables of Ptolemy, annexed to the fifteenth chapter of book second. To make this proof evident, it will be necessary to give some account of this part of his work.

In the twelfth chapter of book second, he begins to treat of the sections of the harmonic canon, for proving, by experiment, the truth of the ratios he had delivered for the genera, and proposes to exhibit these sections for each genus, in all the seven tones. Then, after shewing the defects of the monochord canon in use, and (chapter thirteenth) the insufficiency of the improvements made thereon by Didymus, he proposes, and explains, his own method of applying the canon to eight strings tuned in unison. But, before he proceeds to give the sections upon all the tones, he thinks it necessary to shew, by experiment, the advantage of his own numbers, above those of preceding harmonicians; for which purpose, the exposition of them in one tone, that is, in the immutable system, was sufficient. Accordingly, in chapter fourteenth, (the greatest part of which has been lost, and is supplied from conjecture by Wallis) and in the tables annexed, he gives the sections of the Dorian species of diapason; where the diazeumatic tone, lying in the middle, left a complete tetrachord on each side, for the exposition of the generic numbers; and compares his own ratios with those of Archytas, Eratosthenes, Aristoxenus, and Didymus. Then, in the fifteenth chapter, he proceeds, as he proposed, to give the sections according to his own ratios, for the genera most in use in all the seven tones: these sections he has included in two sets of tables, each set containing seven, *viz.* one for each mode; and each table being again subdivided into five, for the generic differences. Now, of these two sets of tables, the first justifies the diagram; for here he has given his numbers upon the eight strings, from *nete diezeug-*

menon to hypate meson; so that the diagram and the tables agree in every respect, except the generic differences, which I had no occasion to consider. In the second set, indeed, the numbers are applied to the diapason, from meso to proslambanomenos; and there being no explanation in this chapter of the distinct use of this second set, nor any reason assigned for giving it, but the convenience of having the option, to begin the tuning from nete or meso (26), this may seem to furnish an objection to the proof proposed to be gained from these tables: but if we look forward to the second chapter of his third book, we shall there see his meaning; which I shall proceed to explain.

Having, in the sixteenth chapter, shewn how the numbers, given in the two sets of tables, are to be applied to an octachord canon, he proposes, in the first chapter of the third book, to shew, how the divisions for the fifteen sounds of the whole disdiapason system might, if required, be found, according to the same ratios he had already assigned for the extent of a diapason. Now, for the doing this, two inconveniences were to be obviated. First, If the instrument, on which this experiment was to be tried, was to receive an addition of seven strings, to complete the disdiapason, and these additional strings were all to be in unison with the eight before applied, it would happen, that, in shifting the moveable magas, or bridge, to the sections required, those strings, which were to exhibit the acute sections of the tetra-

(26) "Ιν' ἔχωμεν ἀφ' ὀποτέπεις ἀν τὴν ἀρχὴν περιποιεῖσθαι ποιεῖσθαι τὰς ἀρμογόδες. Ptol. Harm. p. 174. v. ult.

chord hyperbolæon, would have so little space left between the magas and the extremity of the string, that it would be difficult for them to yield a distinct sound. And secondly, The canon must be crowded with these additional divisions, which would also have its inconvenience. To remedy this, he proposes several methods; the first of which is, to fit the instrument with fifteen strings, of which the eight, that were to receive the divisions from mese to nete hyperbolæon, should be in unison, at the pitch of mese, and the other seven in unison, at the pitch of proflambanomenos. Now, as the succession from the string proflambanomenos to the string mese, though it varied with the modes, was yet, in the same mode, always the same with that from mese to nete hyperbolæon, the difference of a diapason in pitch excepted, it is plain, that, under this adjustment, a canon divided for the one diapason would serve equally for the other, the difference in pitch being established before in the open strings. By this method, therefore, the divisions for the acuter diapason would be as large as those for the graver, and the canon needed not to be crowded with a greater number of divisions, than had been used for the single diapason, by reason of its double application. The other methods, which he proposed, I need not go through the explanation of, farther than to remark, that, for those, as well as for this, a fresh set of numbers was necessary, those contrived for the succession of the diapason, from hypate meson to nete diezeugmenon, being no-ways applicable to a succession, which began from proflambanomenos or mese. And this, it seems, was his reason for giving the second set of tables in his fifteenth chapter,

chapter, as appears from his own words, in the second chapter of the third book.

In general, for such uses, as comprehend a diapason only, it behoves us to employ, out of the numbers exhibited, those which contain the section from nete diezeugmenon, that the melos may be taken in the middle tensions; but for such as comprehend the disdiapason, those exhibited from nete hyperbolæon, or mese, that the tuning may be adjusted at both extremities alike (27).

Here we see he fully explains his former meaning; and, in recommending his first set of tables for the uses of a diapason, gives the same reason for the choice of that diapason in particular, as he assigns for it in the eleventh chapter of the second book, *viz.* that the melos may possess the middle of the instrument. But it must be observed, that when the whole disdiapason has been adjusted by the second set of tables, the tunings of the eight strings, from nete diezeugmenon to hypate meson, will come out, for every mode and genus, the very same, as if they had been tuned by the first set: so that no inference can possibly be drawn from thence, either that the author has varied as to his own meaning, or that the diagram, which I have given, does not correspond with it.

(27) Καθόλαχ ὃς ἀριστοκτέον, τὸς ἐκκειμένης ἀειδήμας ἐπὶ μὲν τὸ διὰ πασῶν μύονος ἀριστεράς χρίσεσι, τὸς ὑπὸ τῆς νήτης ἐπὶ διεξευγμένων ἔχοντας τὴν καλλιόμην ἵνα εἰς τὸ μέσον τάσσεσιν ἐκλαμβάνησι τὸ μέλος. ἐπὶ δὲ τὸ διεσ διὰ πασῶν, τὸς ὑπὸ τῆς νήτης ἐπὶ ἀνθετολαίεν, ἢ τῆς μέσους, ἐκτειμένης ἵνα κατ’ ἀμφοτέρων ἐπίκρων γένη ὁμοίων ἐφαρμόζεσθαι δύνησι. Ptol. Harm. p. 228. v. 15.

5. I come now to the fifth point, which has been the subject of much dispute, and which might well afford an endless controversy, whilst the union of the two doctrines was not understood; for whatever reasons, from probability or testimony, might be urged in favour of the musical, the harmonic doctrine appearing to be still better supported, and seeming to contradict the other, was sure to suspend the decision, at least, if not gain one in its own favour. But the agreement between the two doctrines being shewn, and their views distinguished, the testimony borne to the harmonic doctrine will no longer be in the way of the musical, and we may safely allow whatever appears favourable to the latter, its full weight. I shall therefore offer, in support of this point, the six following arguments.

First, No one accustomed to hear and judge of the effects of music, can conceive, that a mere alteration in pitch of the same melody, though in the hands of the most artful master, can have so powerful an effect, to change the mode or style of composition, as an alteration of the melodious succession: or, if this should be asserted, it might be disproved, by an appeal to the works of all the composers of eminence among the moderns; who having, in all the variety of their modulations, but one change, that truly answers to the musical doctrine of the modes, *viz.* the change of the succession of the same key, from the major third to the minor, have all reserved this change for their pathetic passages. I shall give but one instance of it, from our countryman Purcell, who, in his *Mad Bess*, has so happily introduced this change, upon the words, “ Cold and hungry am I
“ grown,”

“grown,” that if the performer does justice to the composition, the hearer can scarce help fancying himself affected with the very sensations, with which the starts of frenzy are there pictured.

2dly, If I have been right in assigning a greater antiquity to the musical doctrine, than to the harmonic, the effects of the modes must, in earlier times at least, be referred to the former. And this carries with it an argument for later times also; for the old principle of the modes could not be suddenly changed. And though it may be urged, from the introduction of the eight spurious modes, that the harmonic doctrine came, in time, to be considered as a principle independent of the other, this will only prove a corruption of the better doctrine, which may safely be admitted; though that the musical doctrine was ever quite disused, unless in very late times indeed, I much doubt, as some traces of it are found in almost all the writers come down to us.

3dly, Ptolemy's rejecting the eight modes, that wanted the support of the musical doctrine, is another proof. For, if the harmonic doctrine had been the more essential of the two, those modes ought to have been preserved. Nor does the admission of six of them, by the Aristoxenians in earlier times, weaken the force of this argument: for though the rejecting them is conclusive, against the harmonic doctrine, as far as any weight is allowed to the opinion of the rejecter, the argument from their admission will not conclude in its favour, till it be proved, that in the use the species of diapason afforded by these modes was not attended to, but only the order from the proflambanomenos, in power of each, as the favourers of the

the harmonic doctrine seem to suppose: and this proof it would not be easy to obtain, since each of these modes had its species belonging to it, and was only exceptionable, because it repeated the melody of one or other of the seven.

4thly, The denominations given by the Aristoxenians to five of the spurious modes, after the genuine ones, whose species they afforded, furnish another strong proof; for this could scarce have happened, if the pitch of the system had been the principal distinction.

5thly, We find in Plutarch, Pliny, and other authors, the invention of particular modes ascribed to particular musicians; which may be accounted for, on the supposition, that the modes were so many different species of diapason; since it requires great art and skill to introduce agreeably melodies, to which the ear has not been accustomed: but the taking the same melody at a different pitch is a variety, for which the inventor would hardly have had his name so carefully delivered to posterity.

But 6thly, there are passages, that strongly confirm the preceding arguments. Aristoxenus speaks of modes of the *melopœi* (28), by which I understand him to mean the species of diapason, in contradistinction to the modes of the harmonicians; for I suspect the modes of *melopœia*, mentioned by Aristides Quintilianus (29), and divided by him into three kinds, *viz.* nomic, which was *netoides*; *di-thyrambic*, which was *mesoides*; and tragic, which

(28) Pag. 40. v. 21.

(29) Pag. 29. v. ult.

was hypatoides; and which are also mentioned by other writers, of a low age (30); these modes, I say, I suspect to be founded on distinctions not in use so early. The use of the species of diapason in melopœia is confirmed also by Bacchius, who, immediately after explaining them, expresses himself thus:

“ So many, therefore, in the art of music, are the species of the consonances, by which every melopœia is formed (31).”

And also by Aristides Quintilianus, who concludes his doctrine of the species, with these words:

“ And thus much suffices concerning systems, which the antients also styled the ethic principles (32).”

For, by systems, we are here to understand systems in the general sense, as defined and treated by the Aristoxenians, whom Aristides follows in this part of his work, and more particularly the three consonant systems, whose species he had just been describing.

The passage I have already cited from Plato, serves also strongly to support this point; for the terms, species, and figure, are there used in the strict technic sense, and not merely to express variety, as appears from his speaking, in the same passage, afterwards of the species of melos, the sense of which cannot be mistaken; and that he is speaking of music, in

(30) *Martianus Capella*, p. 189. v. 21. *Manuel Bryennius* in *Oper. Wallisii*, p. 503. v. 14.

(31) Τοιοῦτα μὲν εἰσὶ τὰ συμφωνῶν τὰ εἴδη ἐν τῇ μετικῇ τέχνῃ, διὸ ἀν πᾶσα μελοποία συνιστᾶται. *Bacch. Sen. Introd. Art. Music.* p. 19. v. 18.

(32) Πλει ἡδὲ ἐν συστημάτω, ἀντίθετος ὁ παλαιὸς τῷ ἐθνῶν ἐνάλευτον τοῦτο. *Aristid. Quintil.* p. 18. v. 12.

respect

respect to its effects, is manifest, from the whole passage: so that, though the modes are not directly mentioned, they are necessarily to be implied. But Ptolemey is still more express; for, in the passage cited above, from book second, chapter seventh, he directly affirms, that the ethos, or character of the mode, depended on the musical doctrine, and not on the harmonic; and is still more explicit, to the same purpose, in the passage cited also from the sixth chapter of the same book. These two passages are so clear, that there is no evading their testimony, but by supposing the author to be singular in his opinion; which there is, indeed, room to think was his case, with respect to many of the musicians, his contemporaries; for the pains he has taken to clear up and distinguish the two doctrines, is a sufficient proof, that mistakes had prevailed concerning them; but that what he has advanced is not repugnant to the doctrines held in earlier antiquity, has, I think, been amply shewn. I shall now close these proofs with three remarkable passages from Plutarch's dialogue on music, which will all become intelligible from the explanation given of this subject, at the same time, that they will serve to confirm it. The first respects the invention of the Mixolydian mode, which we shall see he treats as a species of diapason, telling us between what sounds of the system it lay, and in what part of the diapason the diazeumatic tone was situated; in both which circumstances, the passage agrees with the preceding explanation, and with the first diagram.

“ Lysis informs us, that Lamprocles the Athenian, seeing, that it (the Mixolydian harmony) had not the

disjunction (diazeumatic tone), where almost every one imagined (meaning in the middle of the diapason, for so it was in the Dorian, which was most familiar to the Greeks), but at the acute, made the figure of it such as that from paramese to hypate meson (33)."

The next passage informs us of a very remarkable circumstance, *viz.* that, after the addition made to the lyre of the tetrachord hypaton, no use was made of those strings in the Dorian mode, though they were employed in the rest. Speaking of the earlier times, and arguing, that the antients had omitted many things, rather from choice than ignorance;

" It is manifest (says he), that, in respect to the [tetrachord] hypaton, it was not through ignorance, that they abstained, in their Dorian [compositions], from this tetrachord; for they employed it in the rest of the tones, as plainly knowing it; but, for the sake of preserving the ethos, they left it out in the Dorian tone, as respecting the beauty thereof (34)."

From this passage it is evident, that the Dorian melody, which, in its proper character, according to the musical doctrine, was terminated by hypate meson, was in such esteem with the Greeks, from a long habit of hearing their best pieces composed in that succession, and within that compass,

(33) Λύσις ἦ (φησι) Λαμπρόνιλεα περὶ Ἀθηνῶν συνιδόντα ὅτι ἐπιτάχα ἔχει τὸ διάζευξιν, ὅπερ χειρὸν ἀπαίτησεν οὐδοῦ, ἀλλ' ἐπὶ τὸ ξύ, τοῦτον αὐτὸς ἀφγάσσεται τὸ ξύμα οὐ τὸ ξύ τοῦτον ἀφγάσσεται ἐπὶ ναοῦ τοῦτον. Plutarch. Dial. de Musica.

(34) Δῆλον ἐγένετο τὸ πεῖστον τοῦτον, ὅτι τὸ διάζευξιν ἀπείχοιτο ἐν τοῖς διαριστοῖς τοῖς τετραχόρδοις τοῖς τε, ἀντίκα ἐπὶ τὸ λοιπὸν τὸν ἔχρων, μηλονότι εἰδότες διὰ τοῦτο τὸ ηὔτες φυλακὴν ἀφήνειν ἐπὶ τῷ δωεῖτε τὸν τιμῶντες τὸ καλὸν αὐτῷ. Ibidem.

that

that the additional strings could not be ventured upon in that mode, though in the rest they were admitted.

The last passage is that, which I have mentioned above to have been censured by Meibomius: we shall see here, that the author is expressly arguing for confining harmonic within its proper sphere, and not suffering it to encroach on melopœia, by engaging with the rules of propriety, in the use of the elements; so that it both justifies and explains the distinction I have made above, between the two sciences, and turns the censure of Meibomius upon himself, who seems, indeed, without excuse, unless we suppose him to mean only, that Plutarch, in giving the Aristoxenian division, ought not to have sunk any part of it: which remark would have been just, if Plutarch had given the division as such; but he does not name the school, though he adopts their distribution of the science as far as the six divisions he approved; so that no inconsistence can be charged upon him. The latter part of this passage also confirms the distinction I have made between the two doctrines, and their use in the two sciences; so that it affists most of the preceding arguments and proofs: and here I shall therefore rest this point, which will scarce be thought to need farther support.

For it is evident, that the immediate objects of harmonic are genera, *viz.* those of the hermosme-
non, intervals, systems, sounds, tones, and systematic mutations; and farther than this it cannot go: so that we ought not to expect it should determine how far the poet, in his music, has properly assumed the

Hypo-

Hypodorian tone, for instance, for the outset; or the Mixolydian and Dorian, for the conclusion; or the Hypophrygian and Phrygian, for the middle; since the harmonic treatise does not extend so far, but has need of many others. For of the force of propriety it cannot judge, since neither the chromatic nor the enharmonic genus will ever contain a perfect force of propriety, such as to discover the ethos of the composition, that being the business of the artist. And again, it is plain, that the voice [pitch] of the system is to be distinguished from the melopœia wrought in the system, the consideration whereof does not belong to the harmonic treatise (35). Having now finished my head of proofs, I come,

Lastly, To consider how far this subject has been understood by Meibomius, Wallis, and some few others that have wrote since; and in what respect their explanations differ from my own.

In respect to the opinion of Meibomius, Malcolm tells us, that that writer, in his notes on Aristides Quintilianus, affirms the differences of the modes,

(35) Δῆλον γὰρ ὅτι οὐ μὲν ἀρμονικὴ γνῶσην τε τὸν ἕρμοσμένην καὶ διατηρήσανταν καὶ συσηματεῖν καὶ φθόγονον καὶ τόνον καὶ μελοδολῶν συσηματικῶν ἔστι γνωστικὴ, πορρωτέρα δὲ ὑπέτι ταῦτην φρονελθεῖν δύναται. οὐδεὶς δὲ διπλῶν τοῦτο τάντης τὸ διαγνῶναι δύναται πότερον δικείως εἴλυσεν οὐ ποιτης, δύμοιον ἐπεῖν, ἐν μίσασι τὸν ποσθέλειν τόνον ὅππος οὐδὲ ἀρχὴν, οὐ τὸ μιξολύδιον τε καὶ δέσμειον ὅππος οὐδὲ ἔκβασιν, οὐ τὸ οὐσορρύγιον τε καὶ φρύγιον ὅππος οὐδὲ μίσον. Οὐ γάρ διατείνει οὐδὲ ἀρμονικὴ πεγματεῖα πρὸς τὰ πιστά, περιστάται δὲ πολλῶν ἐτέρων. Τοῦτο γάρ τὸ οὐκετικὸν δύναμιν ἀγνοεῖ. Οὐτέ γάρ τὸ χρηματικὸν γένος, οὐτέ τὸ ἐναρμόνιον οὐδὲ ποτὲ ἔχον τὸ οὐκετικός δύναμιν τελείαν οὐ καθ' ἓν τὸ τὸ πεποιημένην μέλος οὐδὲ οὐ ποιεῖται, ἀλλὰ τόπο τὸ τεχνήτες ἔργον. Φανερὸν δὲ ὅτι ἐπέρχεται τὸ συσηματικὸν οὐ φανήται τὸ ποσθεματικὸν μελοποιίας, περὶ οὐκέτι δεύτεροι τὸ ἀρμονικῆς πραγματείας. Plutarch. Dial. de Musica.

upon which all the different effects depended, to have been only in the tension, or acuteness and gravity of the whole system (36). And indeed, in the note on page 13. verse 4. of that author (37), which, I presume, Malcolm had under his eye, Meibomius clearly decides for the harmonic doctrine, as he does also in his note on page 2. verse 1. of Euclid's Harmonic Introduction (38). But in this last note, he had just before told us, that tone was by the antients also called harmonia, and species of diapason (39). And, in the conclusion of his note on page 1. verse 10. of the same author, he delivers himself more fully to the same purpose.

“ The antients (says he) having considered several species of diapason in the bisdiapason, called these also harmonics. Whence we read Dorian, Phrygian harmony, in the best writers. The same were again called tones and tropes, or modes (40).”

In

(36) Malcolm's Treatise on Music, p. 540.

(37) *Hic autem locus oppidò notandus est contra recentiorum de tonorum effectibus opiniones, illorum enim varietates, *so*, *la*, acuminis atque gravitatis differentia veteres unanimi consensu definita—Acumen autem ac gravitatem nihil varietatis cantilenæ adferre contra omnem eruditam vetustatem, imo communem sensum existimant.* Meibom. in Arist. Quint. p. 219.

(38) *Tonus seu modus est totius systematis harmonici, hoc est bisdiapason aut simpliciter diapason differentia; ut Phrygian tonus à Dorio nulla alia re differt, quam quod totum Phrygii sistema acutius sit toto Dorii systemate, tono, qui est in ratione super-octava.* Meibom. in Euclid. Introd. Harm. p. 46.

(39) *Toni vocabulum quatuor modis accipitur;—hīc idem est quod modus; cum dicimus tonus, five modus Dorius, Lydius, Mixolydius; veteribus quoque harmonia appellatur, et species diapason.* Ibidem.

(40) *Cum autem plures diapason species in bisdiapason antiqui spectarent, illas quoque appellarent harmonias. Unde Doria, Phrygia*

In his note also on the passage I have cited above, from Aristides, page 18. verse 11. he explains the expression, quality of the harmony, to signify the species of diapason, or tone (41), which is the sense I have put upon it. We see therefore, that though he hastily ascribes to the harmonic doctrine alone the effects, which I have supposed to arise only from the musical, yet he clearly admits both the doctrines to be warranted from antiquity; and I am glad to have so far the support of this learned critic's opinion: but of the connection between the two doctrines, as I have explained it, I see no trace in his notes; nor is it to be imagined, but that, if he had seen it, he would have enlarged upon it.

In respect to Dr. Wallis, though he had the advantage of the notes of Meibomius, who had cleared up so many difficulties, and had also taken under his own management the text of Ptolemey, the author, of all others, the most likely to have given him a thorough insight into this subject, yet we find him not only defective in his explanations of it, but, contrary to his usual accuracy, even in misleading his readers by false doctrines. With respect to the musical doctrine, if we may judge by his silence, he appears to have seen less of it than Meibomius; for, in the appendix to his edition of Ptolemey, wherein he

gia harmonia, apud optimos autores legimus. Deinde eadem toni et tropi, seu modi sunt appellati. Meibom. in Euclid. *Introduct. Harm.* p. 42.

(41) *Id est quæ sit species octachordi, seu quis tonus; nam duabus modis usurpatur vox *apponere*, uno pro genere enarmonio, altero pro tono, seu tropo, seu modo; quæ significatio est huic loco propria.* Meibom. in Arist. *Quint.* p. 230.

under-

undertakes to explain the harmonic elements, after treating of the species of diapason, he gives not the least hint, that they had any relation to the modes, except by giving their denominations; and in doing this, he expresses himself (42) as if he thought these denominations rather assigned for some separate reason, than on account of their connection with the modes; though, as he was going immediately to the doctrine of the tones, this was the place, where he might have been expected to have taken notice of the connection between the two doctrines, if he had observed it. In treating of the modes, indeed, though he explains them on the foot of the harmonic doctrine only (43), he assigns some of his author's reasons for reducing them to seven (44). And his note also on the beginning

(42) Atque hæ quidem diapason species septem sua singulæ fortiebantur nomina; prima dicta est Mixolydia; secunda, Lydia; tertia, Phrygia; quarta, Doria; quinta, Hypolydia; sexta, Hypophrygia; septima, tum Locrensis tum Hypodoria. Tandem de modis, seu tonis dicendum restat. App. ad Ptol. p. 311.

(43) Modus itaque, seu tonus, prout hic sumitur, denotat vocis locum, non quo una vox, sed quo tota vocum series, seu systema canitur; acutiorē puta, gravioremve. Ut pote prout apud nos *mi* canitur, nunc in *b f b mi*, nunc in *elami*, nunc in *alamire*, &c: Sic apud illos verbi gratia, parameſe potestate (quod tantumdem est atque nostrum *mi*), posita erat nunc in parameſe positione, nunc in positione nete diezeugmenon, nunc in mese, &c. Ibid. p. 312.

(44) Contra hos, qui tonos, seu modos, sic augent per hemitonia disputat Ptolemæus, cap. 7, 8, 9, 10, 11. lib. ii. docetque modorum variorum usum non in hunc solum finem introductum, ut acutior graviorve sit totius cantus tenor; quippe huic sufficeret cantoris vox acutior graviorve; aut musici organi ad hosce tenores accommodatio.—Sed eo potissimum fine fuisse introductum, ut in ipsius cantus curriculo transitus fiat de modo in modum, quam vo-

ginning of chapter eleventh, book second (45), rightly explains the species of diapason, as they lay between hypate meson and nete diezeugmenon: but this interpretation is formally introduced with a *nempe hoc vult*, as if he thought his author singular in this doctrine, and looked upon the doctrine itself, as stated in that passage, rather as explanatory of an incidental circumstance attending the harmonic doctrine, than meant to assign the true doctrine of the modes. This is manifest, from his drawing the same inference, both in this note and elsewhere (46), from this musical doctrine of the species, as he had drawn before from the harmonic one, *viz.* that the tones thus

cant ($\muέλασθαιν κατα τονον$) mutationem secundum tonum: quod à nostris fit mutata clavis signatura adhibitis mollis et duri notis, &c. —Et propterea tonos distinctos ponendos esse docet omnino septem, Mixolydium, Lydium, Phrygium, Dorium, Hypolydium, Hypophrygium, et Hypodorum. Totidemque admittit hodierna musica pro varia clavis signatura. Ibid. p. 313.

(45) Nempe hoc vult: diapason illud expositum ab hypate meson ad neten diezeugmenon; hoc est (in musica hodierna), ab elami ad elami, his vocibus post primam cani in tono Mixolydico, *fa, sol, la, fa, sol, la, mi*; quæ est prima species diapason, habens *mi*, seu tonum diazeugticum in loco præcedente, seu acutissimo: his in Lydio, *sol, la, fa, sol, la, mi, fa*; quæ est species secunda diapason, habens *mi*, in loco secundo ab acutissimo: in Phrygio, *la, fa, sol, la, mi, fa, sol*: in Dorio, *fa, sol, la, mi, fa, sol, la*: in Hypolydico, *sol, la, mi, fa, sol, la, fa*: in Hypophrygio, *la, mi, fa, sol, la, fa, sol*: in Hypodorio, *mi, fa, sol, la, fa, sol, la*; quæ sunt tertia, quarta, quinta, sexta, et septima species diapason; habentes *mi*, in loco tertio, quarto, quinto, sexto, et septimo, ab acutissimo: quæ omnia in musica nostra mollis et duri notis varie positis indicantur, ut mox dicemus. Not. ad Ptcl. p. 136.

(46) Ut soli supersint Ptolemæi septem, Hypodorus, Hypophrygius, &c. totidemque agnoscit hodierna musica positio *mi* in *F, G, A, b, c, d, e*. Ibid. p. 154, ad finem.

settled by Ptolemey are acknowledg'd by the moderns, in their seven positions of the *mi*. For nothing favours less of the musical doctrine, than what the moderns hold in this respect. And it is manifest also, from his neglecting to assist the explanation of this doctrine of Ptolemey, by any citations from other authors, that speak to the same purpose; which he would not have failed to do, if it had struck him as an antient and genuine theory of the modes. But it is plain to me, that, however he may have penetrated the sense of these particular passages, he did not grasp their consequences. This the mistakes he has fallen into sufficiently shew; which I shall now proceed to point out, and which a thorough comprehension of the subject could not but have prevented.

In speaking of the mese of the Hypophrygian mode, he explains it by *c*#, instead of *f*# (47), a mistake, which, I think, must be imputed to his haste.

In the table of the modes, which he has given from Meibomius (48), he has placed the letters in use with the moderns, against the Hypodorian, as well as the Dorian, making A answer to the proslambanomenos of the former, as well as the latter; by which, it is to be presumed, he means them to express the absolute pitch of the sounds in the Dorian, and in the Hypodorian, to denote only the general relations of the system; but this should have been farther explained.

(47) Not. ad Ptol. p. 154. lin. 41.

(48) P. 155.

But his greatest mistake, and which I know not how to reconcile to his usual caution, is in the method he gives for finding the places of the meses for the seven modes. Not only is this method erroneous, but he gives it expressly as the method of Ptolemy (49), though no such direction is to be found in his work. As I have already given Ptolemy's method, in our modern terms, for the sake of brevity, from his tenth chapter, where it is delivered, I shall here give that of Wallis, in the same terms, that the difference between the two may more easily be seen.

“First pitch the Dorian, which is the middle tone, suppose in A; rise a fourth to D, for the Mixolydian; fall a fifth to G, for the Hypolydian; rise a fourth to C, for the Lydian. Then begin from the Dorian again, and fall a fourth to E, for the Hypodorian; rise a fifth to B, for the Phrygian; and fall a fourth to F#, for the Hypophrygian (50).”

By this method, we see the meses of the Lydian and Hypolydian are brought out at *c* and *f* natural; whereas, by Ptolemy's, they come out at *c*# and *f*#, where I have placed them.

This mistake, I apprehend, the doctor was led into by the eleventh chapter of Ptolemy's second book, where the meses of the Lydian and Hypolydian are settled in trite diezeugmenon and lichanos meson; which strings, in their natural situation, in the Dorian mode, were tuned to *c* and *g* natural;

(49) Hanc autem methodum adhibet Ptolemæus in tonis suis septem designandis, &c. — primum omnium facit, &c. secundo tonum sumit, &c. App. ad Ptol. p. 313 & 314.

(50) Ibid. p. 313. lin. ult. usque ad p. 315. lin. 20.

but,

but, in this chapter, the author means only to fix the numerical string allotted for each *mesē*, without regard to its pitch, which was to be regulated by the distances assigned for the tones in the tenth chapter. And by these distances, and all other concurring circumstances, it is manifest, that the two strings in question were, in these modes, to be made a semitone, more acute than their natural situation, as I have already observed, in explaining the harmonic doctrine. How, therefore, the doctor could so far wander from the true theory, which lay before him in the text of his author's tenth chapter, as to substitute a different method, and deliver it, with great prolixity of explanation, as the method of his author, is what I know not how to account for, much less reconcile to his accustomed care and fidelity. What is still more extraordinary, is, that, after finishing the directions and explanations of his own method, he, in the very next paragraph, cites the very tenth chapter of Ptolemy, where the method is given (51), in order to infer with his author, that the Mixolydian tone was distant from the Lydian a hemitone; the Lydian from the Phrygian, a tone, &c. though this inference, which is true only from Ptolemy's method, directly contradicts all he had been delivering. Could he overlook the falseness of this inference, whilst he was taking so much pains

(51) His *positis*, inde colligitur (ut cap. 10.) toni Mixolydii à Lydio distantiam limma, seu crassius loquendo hemitonium; hujus à Phrygio, tonum; hujus à Dorio, tonum; Dorii ab Hypolydio limma; Hypolydii ab Hypophrygio, tonum; hujusque ab Hypodorio, itidem tonum. App. p. 315. lin. 21.

with the subject? But not to insist farther on the slips of a writer, to whom the learned world stands so highly indebted, I shall take leave of him, with this remark only, that whatever he may have seen of the truth of these doctrines himself, his explanations have not succeeded in making the subject clear to succeeding writers; those I have seen having either adopted the harmonic doctrine only, or been so confounded between the two, as to give a right account of neither. This has, in particular, been the case with Malcolm, who, in his Treatise on Music, explains that of the antients, and has taken some pains to reconcile the two doctrines of the modes. The greatest part of what this writer delivers is not only false, in respect to the order, positions, and, indeed, almost every other circumstance attending the modes, but, at the same time, scarce intelligible; or, if any meaning can be put upon it, it is too foreign to the truth of either of the doctrines, to be worth considering. I shall content myself with citing a passage from him, where his reasoning is the clearest, and where we may see, that, after all the pains he has taken to reconcile the two doctrines, he owns himself unable to make any sure decision upon the subject.

“ He (Ptolemy) says, in the beginning of that chapter (cap. 7. lib. ii.), the mutations, which are made by whole systems (which we properly call tones, because these differences consist in tension), are infinite, with respect to possibility, as sounds are; but actually, and with respect to sense, they are finite. All this seems plainly to put the difference of the tones only in the acuteness or gravity of the whole; else, how do their differences consist in tension, which signifies

signifies a certain tenor or degree of tune? and how can they be called infinite, if they depend on the constitution of the octave? Yet, elsewhere, he argues, that they are no other than the species of octaves, and as such, makes their number seven; and accordingly, in all his schemes, sets down their different modulations. But, in chapter sixth, he seems more plainly to take in both these differences; for he says, there are two principal differences with respect to the change of the tone, one, whereby the whole song is sung higher or lower, the other wherein there is a change of the melody to another species than it was begun in; but this, he thinks, is rather a change of the song, or *melos*, than of the tone; as if again he would have us think, this depended only on the acuteness and gravity of the whole. So obscurely has the best of all the antient writers delivered himself on this article, that deserved to have been most clearly handled. But, that I may have done with it, I shall only say, it must be taken in one or other of the sences mentioned, if not in both; for another, I think, cannot be found (52)."

Notwithstanding the confusion in this author's explanations, and his leaving the question thus undecided, it is his account of the modes, that seems chiefly to have been adopted by compilers since. And hence we find nothing better in the Cyclopædia of Chambers, or the Musical Dictionary of Graffneau, than a repetition of these doubts and perplexities. Amongst the French writers, Brossard, in his *Dictionnaire de Musique*, throws no light upon this sub-

(52) Malcolm's Treatise on Music, p. 538. lin. ult.

ject, his account of the modes respecting chiefly those of much later times, which were distinguished into plagal and authentic, and with which the present question has very little concern. Nor have I met with any thing satisfactory from their academicians, though some of them appear to have taken great pains with the subject. The writer amongst these, who seems the most conversant with the music of the antients, is Monsieur Burette, who, in the Memoirs of literature, has furnished many pieces on the various branches of the science. Amongst others, there is a dissertation of his on the melopœia of the antient music, which the learned academician should rather have intituled a dissertation on harmonic; for it contains an explanation of the elements of that science. This author seems little apprized of the musical doctrine; nor has he given a right account even of the harmonic one, having followed Wallis in his mistake, in respect to the method, by which Ptolemey fixed the positions of his seven modes (53), and even drawn the same contradictory conclusion (54):

(53) Qu'ainsi on devoit renfermer dans l'espace d'une octave tous les modes, dont le Dorien devoit occuper, comme le centre, les six autres etant disposez de façon, que le Mixolydien fut d'une quarte plus haut que le Dorien; l'Hypolydien d'une quinte plus bas que le Mixolydien; le Lydien d'une quarte plus haut que l'Hypolidien; l'Hypodorien d'une quarte plus bas que le Dorien; le Phrygien d'une quinte plus haut que l'Hypodorien; et l'Hypophrygien d'une quarte plus bas que le Phrygien. Dissertation sur le Melopée, &c.

(54) D'où il paroît, qu'a compter de l'Hypodorien, qui est le mode le plus bas, il y a de celui ci à l'Hypophrygien l'intervalle d'un ton; de l'Hypophrygien à l'Hypolydien un autre ton; de l'Hypolydien au Dorien, un demiton; de ce dernier au Phrygien, un ton; du Phrygien au Lydien encore un ton; et du Lydien au Mixolydien, un demiton. Ibidem.

whence

whence it appears, that he relied on the doctor's appendix for this part at least of his explanations. In his notes on the dialogue of Plutarch, printed also in the same memoirs, the not understanding the musical doctrine has led him into a very false explanation of the passage cited above, concerning the invention of the Mixolydian mode. He sets out (55) with excluding the only supposition, that could lead him to the sense of his author, by denying, that the octachord system could have any thing to do with this invention; and then flies (56) to two other suppositions, *viz.* that either the hendecachord or disdiapason was here meant, both which are equally wide of the truth. The public is much indebted to this writer, for the laborious collections he has made in these notes, concerning the antient musicians; but his harmonic explanations are not always to be relied on.

(55) Lamprocle n'est point ici donné comme l'auteur de l'harmonie Mixolydienne, il en est regardé seulement comme le reformateur. Mais en quoi pouvoit consister cette réforme? C'étoit, comme le dit Plutarque, à déterminer le véritable système de cette harmonie, ou de ce mode, quant à sa disjonction, ou à l'arrangement des divers tetrachordes, qui composoient ce système. En le réduisant à l'étendue de l'octave, ou de l'octachorde, c'est à dire du double tetrachorde disjoint; le lieu de cette disjonction est unique, et par conséquent n'est point équivoque, comme on le peut voir par la progression de ce système, que voici, *mi, fa, sol, la, si, ut, re, mi*; il ne s'agit donc point ici du double tetrachorde disjoint.

Note 114.

(56) Mais l'hendecachorde, ou le triple tetrachorde disjoint, pouvoit étre le système, dont parle icy Plutarque—supposé qu'il soit icy question du système complet de l'ancienne musique, &c. Ibidem.

The last writer, that I have seen, who has treated this subject, and with whose opinion I shall conclude these sheets, is the anonymous author of a letter to Mr. Avison, concerning the music of the antients, published with the essay of the latter on musical expression, in 1753. This author, who professes but a slender knowlege of the theory, either of modern or antient music, has, in a few pages, discovered himself to be possessed of more than his modesty will permit him to lay claim to. In the matter of the tones, however, (such is the fatality, that seems to have constantly attended this doctrine) he does not appear to have succeeded better than the writers that have gone before him. He blames Sanadon and Cerceau, for affirming, in their observations on Horace, carm. 5. 9. that the Dorian mode answered exactly to our A-mi-la with a minor third, and the Phrygian to our A-mi-la with a major third. Now, that these French critics, though right, inasmuch as they seem to consider the modes as different species of diapason, are, nevertheless, mistaken in their application of them, does, indeed, appear from my first diagram, where it may be immediately seen, that what they assert of the Dorian and Phrygian modes, is true only of the Hypodorian and Lydian; and had the anonymous writer gone no farther in his censure of them, I should readily have joined with him: but he rejects the musical doctrine entirely, and admits only of the harmonic. "Surely (says he (57), speaking of what these critics advance) this is a musical error, and a dream from the ivory gate. Two modes

with the same tonic note, the one neither acuter nor graver than the other, make no part of the old system of modes." And, agreeably to this opinion, he had before (58) described the seven modes, as reducible to one mode, taken higher or lower; which, he says, may be called the mode of A, and must have had a minor third, as *c* natural is a minor third to A-mi-la. Whether this be a just account of the nature of the modes, I must now submit, having said already what has occurred to me, in support of the contrary opinion.

To conclude, if what has been said should be thought to establish any certainty concerning this matter, I should hope it might tend to revive an inquiry into the music of the antients, which seems to have suffered an interruption from the difficulty of arriving at a right understanding of this material branch of it. Such an inquiry may, perhaps, be judged well worth pursuing, not only from the advantages, which modern music might derive from it, but also for the sake of improving the art of poetry, and of better understanding and tasting the noble remains we have of the antient poets; the greatest beauties of whose works, especially the lyric and dramatic, are probably lost to us, for want of seeing their connection with this science.

(58) Page 5.

DISCUSSION OF THE SYSTEM OF DISPLACEMENTS IN THE THREE MODES, ESTABLISHED BY PROKOPENKO.

Subject	1. Personal	2. Family	3. Health	4. Work	5. Social	6. Financial	7. Religious	8. Political	9. Environmental	10. Personal
<i>a</i>	Personal	<i>c</i>	Family	<i>e</i>	Health	<i>g</i>	Work	<i>h</i>	Social	<i>i</i>
<i>b</i>	Personal	<i>d</i>	Family	<i>f</i>	Health	<i>g</i>	Work	<i>h</i>	Social	<i>i</i>
<i>c</i>	Personal	<i>d</i>	Family	<i>e</i>	Health	<i>g</i>	Work	<i>h</i>	Social	<i>i</i>
<i>d</i>	Personal	<i>e</i>	Family	<i>f</i>	Health	<i>g</i>	Work	<i>h</i>	Social	<i>i</i>
<i>e</i>	Personal	<i>f</i>	Family	<i>g</i>	Health	<i>h</i>	Work	<i>i</i>	Social	<i>a</i>
<i>f</i>	Personal	<i>g</i>	Family	<i>h</i>	Health	<i>i</i>	Work	<i>a</i>	Social	<i>b</i>
<i>g</i>	Personal	<i>h</i>	Family	<i>i</i>	Health	<i>a</i>	Work	<i>b</i>	Social	<i>c</i>
<i>h</i>	Personal	<i>i</i>	Family	<i>a</i>	Health	<i>b</i>	Work	<i>c</i>	Social	<i>d</i>
<i>i</i>	Personal	<i>a</i>	Family	<i>b</i>	Health	<i>c</i>	Work	<i>d</i>	Social	<i>e</i>
<i>j</i>	Personal	<i>k</i>	Family	<i>l</i>	Health	<i>m</i>	Work	<i>n</i>	Social	<i>o</i>
<i>k</i>	Personal	<i>l</i>	Family	<i>m</i>	Health	<i>n</i>	Work	<i>o</i>	Social	<i>j</i>
<i>l</i>	Personal	<i>m</i>	Family	<i>n</i>	Health	<i>o</i>	Work	<i>j</i>	Social	<i>k</i>
<i>m</i>	Personal	<i>n</i>	Family	<i>o</i>	Health	<i>j</i>	Work	<i>k</i>	Social	<i>l</i>
<i>n</i>	Personal	<i>o</i>	Family	<i>j</i>	Health	<i>k</i>	Work	<i>l</i>	Social	<i>m</i>
<i>o</i>	Personal	<i>j</i>	Family	<i>k</i>	Health	<i>l</i>	Work	<i>m</i>	Social	<i>n</i>
<i>p</i>	Personal	<i>q</i>	Family	<i>r</i>	Health	<i>s</i>	Work	<i>t</i>	Social	<i>u</i>
<i>q</i>	Personal	<i>r</i>	Family	<i>s</i>	Health	<i>t</i>	Work	<i>u</i>	Social	<i>p</i>
<i>r</i>	Personal	<i>s</i>	Family	<i>t</i>	Health	<i>u</i>	Work	<i>p</i>	Social	<i>q</i>
<i>s</i>	Personal	<i>t</i>	Family	<i>u</i>	Health	<i>p</i>	Work	<i>q</i>	Social	<i>r</i>
<i>u</i>	Personal	<i>p</i>	Family	<i>q</i>	Health	<i>r</i>	Work	<i>s</i>	Social	<i>t</i>
<i>v</i>	Personal	<i>w</i>	Family	<i>x</i>	Health	<i>y</i>	Work	<i>z</i>	Social	<i>a</i>
<i>w</i>	Personal	<i>x</i>	Family	<i>y</i>	Health	<i>z</i>	Work	<i>a</i>	Social	<i>v</i>
<i>x</i>	Personal	<i>y</i>	Family	<i>z</i>	Health	<i>a</i>	Work	<i>v</i>	Social	<i>w</i>
<i>y</i>	Personal	<i>z</i>	Family	<i>a</i>	Health	<i>w</i>	Work	<i>v</i>	Social	<i>x</i>
<i>z</i>	Personal	<i>a</i>	Family	<i>w</i>	Health	<i>v</i>	Work	<i>x</i>	Social	<i>y</i>